FIELD SAMPLING PLAN

PORTAGE CREEK AREA REMOVAL
KALAMAZOO, MICHIGAN

Prepared for:

U.S. Environmental Protection Agency
Region 5

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ACRONYMS AND ABBREVIATIONS

%	percent
°C	degrees Celsius
µ	micron
Ag	silver
AR	air
As	arsenic
Ba	barium
bgs	below ground surface
Cd	cadmium
Cr	chromium
CY	cubic yards
EFF	effluent
EQ	Environmental Quality Management, Inc.
FD	Field Duplicate
FSP	Field Sampling Plan
ft	feet
GAC	granular activated carbon
Gl	glass
H_2SO_4	sulfuric acid
Hg	mercury
ID	identification
IDW	investigation derived waste
in	inches
INF	influent
mg	milligram
mg/kg	milligram per kilogram
MDEQ	Michigan Department of Environmental Quality
ml	milliter
MI	Michigan
MID	between GAC
mm	millimeter
MS	matrix spike
MSD	matrix spike duplicate
N/A	not applicable
NIOSH	National Institute for Occupational Safety and Health
No.	number
NTU	Nephelometric Turbidity Unit
OU	Operable Unit
oz	ounce
Pb	lead

Acronyms and Abbreviations – continued

PCBs	polychlorinated biphenyls
Pl	plastic
PPE	personal protective equipment
ppm	parts per million
PVC	poly vinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RBSLs	Risk Based Screening Levels
RCRA	Resource Conservation and Recovery Act
RRD	Remediation and Redevelopment Division
SA	Slope Area
Se	selenium
sf	square foot
SD	sediment
SM	Standard Methods for the Examination of Water and Wastewater
SO	soil
SOP	standard operating procedure
SRD	Substantive Requirement Document
SU	Sample Unit
SVOC	semivolatile organic compound
SW	surface water
TAL	target analyte list
TBD	to be determined
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TCRA	Time Critical Removal Action
TSCA	Toxic Substances Control Act
TSS	total suspended solids
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WP	Work Plan
WM	wide mouth
WW	wastewater

CONTENTS

APPENDICES

TABLES

FIGURES

1 INTRODUCTION

This Field Sampling Plan (FSP) for the Time Critical Removal Action (TCRA) of contaminated sediment from Portage Creek, a portion of Operable Unit 5 (OU5) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Superfund Site) will be implemented according to the project schedule presented in the Work Plan (WP). Portage Creek Site location and applicable work areas are presented in ***Figures 1*** and ***2***. The purpose of the TCRA for the Portage Creek Removal effort is to remove the existing polychlorinated biphenyls (PCBs) in soils and sediments of the Portage Creek from Alcott Street to the confluence with the Kalamazoo River in Kalamazoo, Michigan (MI).

The section of the Portage Creek Area targeted for action has been divided into 10 distinct Removal Areas within 7 designated Slope Areas (SA1 - SA7) of Portage Creek. Slope Areas are designated by the changes in elevation differences, or slope, of the Portage Creek stream bed. The 10 targeted removal areas will be referred to as SA1-A, SA1-B, SA1-C, SA3-A, SA5-A, SA5-C, Axtell Creek, SA5-D, SA6, and SA7. The Removal Areas are presented in ***Figure 2***. It is anticipated that the work will span two to four construction seasons subject to funding allocations and available working budget. Therefore, as detailed in this overview the project will be divided into four phases with the phases divided up based on approximate equal removal volumes for completion of distinct removal areas. The phases may be split over multiple construction seasons if available budget and working conditions permit completion of individual removal areas.

Phase 1 Overview- Construction activities will begin when the final design has been completed and approved by USEPA and necessary access is obtained. It is estimated that preparation activities in Removal Areas SA7, and SA 6 including mobilization and setup of the equipment, materials, personnel, and facilities necessary to complete the project, began in late summer of 2011. Preparation activities will include building access roads and staging areas, clearing and grubbing vegetation, pre-removal surveying and installing temporary soil and sedimentation control measures. Excavation of SA7 was attempted during fall of 2011 during

Phase 1 but due to flooding was not completed until April 2012. Dredging of SA 6 was completed in June 2012.

Phase 2 Overview-To avoid the challenge, including safety hazards associated with winter work in southwest Michigan, active work was shut down over the winter months and resumed in the spring of 2012. Phase 2 includes excavation within Removal Areas SA7, SA6 SA5-D, Axtell Creek, and if weather allows SA5-C. Phase 2 is expected to be completed in the second construction season during the spring and summer of 2012.

Excavation of SA6 and SA7 resulted in a combined removal of an estimated 3,234 cubic yards (CY) consisting of approximately 159 CY of Toxic Substances Control Act (TSCA) waste [sediments/soils exhibiting PCB concentration ≥ 50 milligrams per kilograms (mg/kg)] and 3,075 CY Subtitle D waste [sediments/soils exhibiting PCB concentrations <50 mg/kg (ppm)]. Note that final excavation waste volumes have not been calculated at the time of writing this document, and are subject to change.

Excavation of SA5-D and Axtell Creek will result in a combined removal of an estimated 5,200 CY consisting of approximately 1,530 CY of TSCA waste and 3,670 CY Subtitle D waste. Based on data gap sampling prior to the start of excavation these waste volumes are subject to change.

If completed in Phase 2, excavation of Removal Area SA5C will result in the removal of an estimated 2,040 CY consisting of 1,448 CY of TSCA waste and 592 CY Subtitle D waste.

Phase 3 Overview- Phase 3 will include excavation within Removal Areas SA5-A, SA3-A, SA1-B and SA1-C and relocation of the staging pad and water treatment facilities. Phase 3 is expected to be completed in the third construction season during the spring and summer of 2013. Excavation of SA5-A, SA3-A, SA1-B and SA1-C will result in a combined removal of an estimated 4,305 CY consisting of approximately 1,127 CY of TSCA waste and 3,178 CY Subtitle D waste.

Phase 4 Overview- Phase 4 will include excavation within Removal Area SA1-A and relocation of the staging pad and water treatment facilities. Phase 4 is expected to be completed in the fourth construction season during the spring and summer of 2014. Excavation of SA1-A will result in removal of an estimated 1,930 CY consisting of approximately 414 CY of TSCA waste and 1,516 CY Subtitle D waste.

Sediment and Soil Removal Operations- Sediment removal in the creek channels will be accomplished by first isolating the excavation areas upstream and downstream with the installation of sheet pile cofferdams. Bypass pumping around the isolated excavation area and discharging downstream of the excavation area will take place from the time the cofferdams are installed to when the cofferdams are removed following stream bank restoration and creek channel backfilling. Isolation area dewatering will be performed to facilitate "dredging-in-the-dry" and backfill/stream bank restoration. Standing water from within the excavation area will be pumped with appropriate sized centrifugal pump(s), and then either sumps will be installed to remove saturated water from sediments with centrifugal pumps or sipper well points will be driven and connected to a manifold system from removal with vacuum pumps. Water collected from isolation dewatering will be transferred via pipeline (to be constructed) to the waste water treatment system constructed to support site operations. During all excavation activities, erosion controls, re-suspension controls, and water collection and treatment systems will be used to reduce potential impacts to water quality. The spatial extent of all removal activities will be confirmed against design objectives and regulatory requirements using confirmatory sampling, physical surveys, and other techniques summarized in the EQ *Erosion and Sedimentation Control Plan*, August 2011.

Removal activities for each phase will include the following steps:

- Characterize removal grids to confirm removal depths, as necessary.
- Prepare temporary staging areas and access roads, as necessary.
- Remove PCB contaminated soil and sediment.
- Water collection from isolation dewatering and subsequent water treatment.
- Transport and dispose of stabilized sediments.
- Sampling, analysis, data validation, and reporting.
- Site Restoration.

This FSP addresses all sampling activities to be conducted as part of this project.

2 FIELD SAMPLING ACTIVITIES

2.1 Rationale

The potential for eroding banks and creek channel bottom in the area of Portage Creek from Alcott Street to its confluence with the Kalamazoo River may serve as a source of PCBs to the Kalamazoo River. This TCRA has been designed to address the removal and stabilization of targeted creek sediments and floodplain soils in the Portage Creek Area using the *Plainwell No. 2 Dam Area Time-Critical Removal Action Final Design Report* (TCRA Design Report, ARCADIS BBL July 2007) as a model. Sampling and analysis activities will be performed for pre- and post-construction conditions, waste characterization, wastewater treatment, personnel and area monitoring, water quality monitoring, pre-removal PCB concentrations and post-excavation soil and sediment conditions.

2.2 Sampling Requirements

In order to remove the PCB hazard identified in the *TCRA Design Report ARCADIS BBL July 2007*, sampling associated with the removal action will be required. Tasks will include:

1. Characterize removal grids to confirm removal depths, as necessary.
2. Prepare temporary staging areas and access roads, as necessary.
3. Remove PCB contaminated soil and sediment.
4. Collection of water from isolation dewatering and decontamination followed by subsequent water treatment.
5. Transport and dispose of stabilized sediments.
6. Confirm decontamination of equipment with wipe samples, as necessary.
7. Confirmation sediment sampling, analysis, data validation, and reporting.
8. Site Restoration.

Sampling activities associated with each of the tasks listed above include the following:

1. Sampling of sediments in targeted area grids to further characterize PCB concentrations at specified depths.
2. Perform pre-construction sampling of support areas (staging areas, wastewater treatment system location and command post area).

3. During removal of PCB contaminated soil and sediment work area monitoring will include the following:
    a. Water quality monitoring
    b. Personnel monitoring
    c. Area monitoring
4. Water collected from isolation dewatering and decontamination will be treated by an on-site water treatment system. Performance sampling and required discharge sampling of the treatment system will be performed in accordance with a MI Substantive Required Document (SRD).
5. Waste characterization sampling and analysis of stabilized soils and sediments will be performed for each slope area targeted for removal.
6. After targeted equipment has been decontaminated, swipe samples of targeted areas will be taken and analyzed for PCBs.
7. After all targeted sediment and soils have been removed confirmation sampling will be performed.
8. Site Restoration.

Table 1 presents the sampling scheme for this project.

2.2.1 Pre-Removal Sediment Sampling

To further characterize PCB concentrations in area grids lacking data pre-removal sampling of targeted grids will be performed. This sampling is intended to confirm sediment removal depths. Sediment sampling will be accomplished by wading into the stream, traveling upstream to the targeted grid area, pushing Lexan tubes to the targeted depths and extracting the sediment cores. Additional soil sampling may be performed to characterize PCB concentration of bank areas. Removal Grids that will be sampled are presented in ***Figure 3*** to ***Figure 9***.

2.2.2 Waste Characterization Sediment Sampling

In order to comply with disposal facility requirements waste characterization of targeted sediments that are to be removed will be performed prior to removal activities. In order to properly dispose of stabilized sediment removed from the targeted areas two separate disposal facilities will be utilized. Stabilized sediment removed from areas exhibiting PCB concentration $\geq$ 50 mg/kg will be disposed of in a facility permitted to received TSCA waste and sediments with PCB concentrations <50 mg/kg will be disposed of in a Subtitle D facility. To complete the

TABLE 1. SAMPLING SCHEME

Location	Matrix	Purpose	Number of Samples /SU	Total Number of SU	SU Locations	Total Number of Samples[2]	Sampling Method
Targeted Grids from each Slope Area	Sediment and soil	confirm sediment removal depth	2-5	26	See Figures 3 to 9	110-113	sediment/soil core composite
Targeted Removal Area	Sediment and soil	waste characterization	4	2-3	9	TBD	sediment/soil core composite
Equipment Associated with Removal	wipe	Confirm Decontamination	1	TBD	TBD	TBD	Surface wipe
Upjohn Park	soil	extent of contamination	1	12-20	TBD	TBD	surface grab
Construction Area	soil	pre-construction & post-construction conditions	6	1/2500 sf	Support Areas[3]	TBD	surface soil composite
Source Material	solids	confirm backfill is clean prior to placement	1	1/5000 cy	TBD	TBD	composite
Turbidity Monitoring Stations	surface water	water quality monitoring	1	3	200 ft upstream, 200 ft and 300 ft downstream	1 measurement each location every 30 minutes	Real Time Measurements - Turbidity
Turbidity Monitoring Stations	surface water	water quality monitoring	1	2	200 ft upstream, 200 ft and 300 ft downstream	2	grab
Personnel Workers within exclusion zone	air	personnel monitoring	1	1 worker	breathing zone of workers in removal/staging areas	TBD	NIOSH 5503
Work Area	air	area monitoring	5	1	2 locations upwind, 3 locations downwind of work area	multiple	real time measurement – DataRam
Perimeter Monitoring	air	confirm no release of contaminants from work areas	1	5	2 locations upwind, 3 locations downwind of removal area	5/day for each day of processing activities	NIOSH 5503
Wastewater treatment	waste water	confirm removal of contaminants prior to discharge	1	3	influent, mid-GAC, effluent	3	grab
Removal Grid Areas	sediment	Confirm removal of PCB contaminated sediment	6	72	See Figures 3 to 9	72	sediment core composite
Removal Grid Areas	sediment	statistical analysis of project objectives	6	8	TBD	48	grab

Notes:

1. SU – sampling unit such as a slope area removal grid or each 2500 sf of construction areas.
2. Does not include QC samples.
3. Command Post, dewatering/staging areas, waste water treatment plant, truck wash.
4. TBD – to be determined, sf – square foot, cy – cubic yards

profile prior to shipment analysis for waste characterization is required to be completed for each waste stream. This will be accomplished by taking separate composite samples of sediment or soils from each Slope Area targeted for removal from sediments/soils expected to be ≥ 50 mg/kg and <50 mg/kg. One or more samples of each disposal waste stream will be taken from each targeted area.

2.2.2 Wipe Sampling

In order to confirm successful decontamination of certain pieces of equipment used for removal, wipe samples will be taken after decontamination has been performed. Representative areas will be selected for wipe sampling. Each wipe sample will be submitted to the laboratory for PCB analysis. Results will be evaluated with an action level of 10 micrograms/100 square centimeters (ug/100 cm^2).

2.2.3 Upjohn Park Soil Sampling

In order to determine the potential of PCB contaminated sediment deposited in the Upjohn Park area biased sampling will be performed in targeted areas. Sample selections will be made based on potential deposition as a result of historical flooding of Portage Creek. This will include low lying areas, areas where visible sediment is observed or other areas identified to be of potential concern. Surface soil grabs will be taken and analyzed for PCBs. The location of Upjohn Park is presented in ***Figure 2***.

2.2.4 Pre- and Post-Construction Soil Sampling

Pre-construction conditions will be characterized by sampling surface soils prior to constructing dewatering pads, establishing the command post area, and constructing the on-site waste water treatment system. Composite samples for PCB analysis will be taken in these areas at a rate of 1 composite sample per 2500 square feet (sf) and additional sample parameters every 10,000 sf in support areas as defined in Section 2.3.3. Post-construction conditions will be evaluated by sampling these areas after all support material and equipment have been removed. Post-construction sampling will be performed in the same manner as Pre-Construction sampling. ***Figure 10*** presents the proposed sample locations for the main staging area located at E. Crosstown Parkway and John Street. ***Figure 11*** and ***Figure 12*** present the support areas for SA6

and SA7, respectively. ***Figure 13*** and ***Figure 14*** present the support areas for Axtell Creek and SA5-D, and SA5-C, respectively.

2.2.5 Borrow Source Material Sampling

Prior to using any borrow source material in restoration or grading activities it will be sampled to ensure clean fill materials are used. Samples will be taken at a rate of one sample per 5000 CY of each type of material excluding river run rock which will be sampled at its original source area. Composite samples will be submitted to the laboratory for analysis. Analytical results will be compared to applicable Part 201 cleanup criteria and Part 213 risk-based screening levels provided in the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division (RRD) Operation Memorandum No. 1 (Table 2, Column #19, *Direct Contact Criteria & RBSLs*), issued by the RRD of the MDEQ on December 10, 2004. If exceedances are reported, that source area will not be used to provide backfill and the material will not be used.

2.2.6 Water Quality Monitoring

During removal of PCB contaminated soil and sediment work water quality monitoring, will be performed. Water quality monitoring will include real time monitoring and surface water sampling.

2.2.6.1 Turbidity Monitoring

Real time, direct-read turbidity readings will be collected daily during excavation activities to identify construction-related contributions, if any, to existing creek turbidity levels. Real time turbidity monitoring will be performed with stations set 300 ft upstream, 200 ft downstream, 300 ft downstream of cofferdams set at each area. Turbidity monitoring will not be performed in SA7, as the removal activities are isolated to the floodplain. Turbidity monitoring will be recorded on half hour intervals by a programmed data logger at the turbidity station. Other readings may be collected based on field conditions such as presence of visible runoff to the creek in the work vicinity, or as part of mitigation measures. Data will be transferred to a computer in the EQ command post trailer via a cellular modem.

Real time turbidity measurements designed to monitor resuspension control systems will be supplemented by inspections of the control systems. Inspections will be conducted each day

at the beginning of activities. Inspections will also be conducted, as appropriate, in response to visible sediment plumes migrating from the work area or measured turbidity levels above the action level. If warranted additional inspections may be conducted following higher-flow periods, noticeable turbidity increase outside the system, unexpected system position/behavior, contact with the system by equipment or debris, or other abnormal events.

Mitigation measures may be taken based on the turbidity data obtained. If the downstream turbidity data are two times (2x) the concurrent upstream data, specific steps will be initiated until the exceedance has been mitigated to below the action level (AL). Note that the measurements made at the location 200 ft downstream of the work area will be used as an early warning of potential exceedances, and the measurement mad at the location 300 ft downstream of the work area will be compared against the AL. The latter will trigger the mitigation measures presented in ***Figure 15*** and summarized below, until the exceedance has been mitigated.

The first mitigation measure implemented in response to the second 30 minute reading which exceeds the AL will be an observation of the area downstream of the work area to determine whether distinct sediment plumes or other characteristics that may indicated the cause of increase turbidity are visible.

- If a sediment plume is visible, its point of origin will be identified through an inspection of the resuspension control system.
  - In the event the resuspension control system is not functioning correctly or is damaged, excavation removal activities will be suspended until any necessary repair or adjustments have been completed.
- If no suspended sediment plume is visible, the submerged turbidity meter will be inspected for damage, malfunction, improper calibration, or other localized condition that may cause or mimic an elevated turbidity reading. A reference reading will be taken using a hand held turbidity meter.
  - If the submerged meter is damaged or improperly calibrated, a replacement unit will be used until the original unit has been repaired and/or calibrated, and returned to service or until a new calibrated unit has been deployed.

- If the submerged meter is functioning properly, an inspection of the resuspension control system will be conducted, and any necessary repairs or modifications will be implemented.

The rate and/or method of removal activities will be adjusted if it is determined that the AL exceedance is a result of work activities and the resuspension control system appears to be functional based on inspection. Note this will apply to work areas where turbidity curtains are used as the primary control system, not sheet pile cofferdam control systems.

- The removal rate will be reduced (as much as 25%), the location will be adjusted, or other modifications will be made, as deemed necessary, and the impact on turbidity levels will be assessed for 1 hour.
- If turbidity has not been reduced to below the action level after 1 hour, the sediment removal rate will be reduced (as much as 50%), or other modifications will be made, as deemed necessary, and the impact on turbidity levels will be assessed for 1 hour.
- If this second adjustment is unsuccessful at lowering turbidity to below the action level, excavation activities will be suspended until acceptable turbidity levels have been achieved.

For cases where it is necessary to reduce the rate of, or cease excavation activities, excavation activities may be resumed (at previous rates) once turbidity readings have been below the action level for 30 minutes, provided that mitigation measures have been completed and unacceptable turbidity levels have not occurred. ***Table 2*** provides a summary of the resuspension monitoring.

2.2.6.2 Surface Water Sampling

Surface water samples will be taken weekly at the upstream and 300 ft downstream location and submitted to the lab for PCBs, total suspended solids (TSS) and phosphorus. Reporting limits and associated methods are presented in the QAPP.

2.2.7 Personnel Monitoring

Baseline/periodic personnel monitoring will be performed by taking personnel samples of workers in the removal and/or the stabilization area during removal activities. Samples will be submitted to the laboratory for PCBs. Reporting limits and associated methods are presented in the QAPP.

TABLE 2. RESUSPENSION MONITORING

Activity	Location	Location /Type	Parameter	Frequency	Metric
Water Monitoring	200 ft upstream of work area; 300 ft downstream of work area	Grab sample	PCBs TSS Phosphorus	Weekly (phosphorus – monthly)	N/A
Routine Turbidity Monitoring	200 ft upstream of work area; 200 and 300 ft respectively, downstream of work area	Turbidity probe at turbidity station	Turbidity (NTU)	Instantaneous readings conducted at 30 minute intervals	2x of concurrent upstream value
Supplemental Turbidity Monitoring	Within and outside the resuspension control system as necessary to identify and correct potential problems with the system	Visual surface inspection	Turbidity (NTU)	As required to diagnose potential source of metric exceedance	N/A
Verification that resuspension control system is properly installed	Entire resuspension control system	Visual surface inspection	Integrity, proper function	Once prior to initiation of work at a given work area and as required in the event of any major repair or modification of the resuspension control system	If integrity or function appears compromised, repairs or modifications will be implemented as necessary
Routine resuspension control system inspections during sediment removal work periods	Perimeter of system, at water surface	Inspections	Integrity, proper function	Daily, and as needed to evaluate potential problem conditions	If the integrity or function of the system appears compromised, repairs or modifications will be implemented as necessary

Notes:
1. N/A – not applicable
2. NTU – nephelometric turbidity units

2.2.8 Area Sampling

Area monitoring will include real time monitoring for particulates using a DataRam in the removal areas and staging pad areas. Monitoring will be performed during active removal operations and stabilization of removed sediments. Monitoring will be performed at the start of site operations and at a minimum of every four hours during removal and stabilization activities. Additional monitoring will be performed as necessary.

Perimeter monitoring will be performed around stabilization activities. A minimum of 5 locations will be selected staging and processing areas to ensure upwind and downwind locations of the work area are monitored for any potential release of contaminants. Samples will be taken for total particulates and PCBs as described in section 2.3.7.

2.2.9 Wastewater Sampling

Water collected from isolation dewatering and decontamination will be treated by an on-site water treatment system. Performance sampling and required discharge sampling of the treatment system will be performed in accordance with the MI SRD. Treatment system performance will be performed for the first two weeks of wastewater treatment operations. Grab samples will be taken of the influent, between carbon units (Mid-GAC) and effluent locations. Samples will be submitted to the laboratory for analysis of PCBs, TSS and phosphorus. SRD sampling requirements are expected to require weekly sampling of the effluent for PCBs and TSS, with monthly samples for phosphorus.

2.2.10 Confirmation Sediment Sampling

Post removal sampling will include sediment confirmation sampling for each pre-established grid. One six-point composite sample will be collected from each of the grids for PCB analysis. Samples will be composted so as to represent PCB concentrations for a depth of 0-6 inches (in).

Node samples will be collected for the USEPA statistical analysis of project quality objectives. Discrete samples will be collected from eight of the confirmation grids. One or two of these node grid sample areas may be sampled in SA6 & SA7.

2.3 Sample Collection

Sampling will be performed throughout various stages of the project from pre-removal sediment sampling to post removal confirmation sampling.

2.3.1 Pre-Removal Sediment Sample Collection

Sampling of targeted grids to confirm pre-remediation PCB concentrations and removal depths (data gap sampling) will be performed in the grid areas presented in ***Figure 3*** to ***Figure* 9**. Depths for each area are presented in ***Table 3***. A sediment core will be manually driven to the desired sampling depth at each location. For each area, sampling of the most downstream grid will be accomplished first. Sampling will be performed by wading into the stream moving upstream to the desired locations. Once the coring device is pushed to the desired depth, creek water will be placed into the top of the tube and subsequently capped to create a vacuum to retain the sediment in the tubes, as necessary. The core will be slowly pulled from the sediment. Before the tube is fully removed from the water a cap will be placed on the bottom end to the tube to retain the sediments. For each sample point GPS coordinates will be recorded. In the event the coring device cannot be driven to the desired depth, a sediment core sampler will be used. EQ standard operating procedure (SOP) *SP-Soil-1 Sediment Sampling and Handling Guidance* presents additional detail regarding sediment sampling. This SOP is presented in Appendix A. Once the sediment core has been removed from the water the tube will be cut to drain the water above the sediment core. The core will be divided into 12 inch sections using a saw to cut through the coring device. Geotechnical information for each core will be recorded on a boring log, ***Figure 16***. A brief description of the lithological information for each subsection of the core will be documented. For each core collected per grid, 1 sample from each 12 inch depth (or partial 12 inch depth depending on material recovery) will be analyzed for PCBs. Each 12 inch section will be composited prior to filling the sample containers for PCB analysis. ***Table 3*** presents the desired maximum core depth and total cores collected for each grid. Field duplicates (FD) will be collected on a 1 per 10 sample frequency. Sufficient volume of sediments will be provided to ensure the laboratory has sufficient sample mass to perform a matrix spike and a matrix spike duplicate. Decontamination is not anticipated to be performed on the dedicated coring devices or to personnel waders.

TABLE 3. PRE-REMOVAL SEDIMENT SAMPLING

Removal Area	Grid	Depth of Samples	No. Cores in Grid	No. of anticipated samples per core
Area 7				
	SA7-4	24 in	2	2
Area 6				
	SA6-1	24 in	1	2
	SA6-6	36 in	1	3
	SA6-10	24 in	1	2
	SA6-11	24 in	1	2
	SA6-14	36 in	2	6
Axtell Creek				
	AXC-1	36 in	1	3
	AXC-3	24 in	1	2
Area 5D				
	SA5-D1	36 in	2	6
	SA5-D2	36 in	1	3
	SA5-D3	36 in	1	3
	SA5-D4	36 in	1	3
	SA5-D7	36 in	1	3
	SA5-D12	48 in	1	4
	SA5-D14	48-60 in	1	4-5
Areas 5C				
	SA5-C2	36 in	1	3
	SA5-C3	36 in	1	3
	SA5-C4	48-60 in	1	4-5
	SA5-C5	48-60 in	1	4-5
Areas 5A				
	SA5-A5	48in	1	4
	SA5-A6	48in	1	4
	SA5-A7	48in	1	4
Area 3A				
	SA3-A1	36 in	1	3
	SA3-A2	36 in	1	3
	SA3-A7	36 in	1	3
Area 1A				
	SA1-A9	36 in	1	3

Notes:

in – inches
No. – number
No. of Samples indicates number of composite samples

2.3.2 Waste Characterization Sediment Sample Collection

In areas where sediments have been identified to contain PCBs levels at ≥ 50 mg/kg and <50 mg/kg composite samples will be taken of each waste stream. One sample will include portions of the removal grids with PCBs ≥ 50 ppm and one sample will include portions of the removal grids with PCBs <50 ppm. For *in situ* waste characterization sampling two to three locations within the removal area will be sampled to the specified removal depths for representative composite sampling. For *ex situ* waste characterization sampling, a representative composite sample(s) will be collected from each slope areas staged material. Composite samples will be submitted to the laboratory for Toxicity Characteristic Leaching Procedure (TCLP) volatiles (VOCs), TCLP semivolatiles (SVOCs), TCLP pesticides, TCLP herbicides, TCLP Resource Conservation and Recovery Act (RCRA) metals, PCBs, total cyanide, total sulfide, flashpoint and pH or as directed by the disposal facility.

2.3.3 Wipe Sample Collection

To confirm successful decontamination of certain pieces of equipment used for removal wipe samples will be taken after decontamination has been performed. Representative areas will be selected for wipe sampling. Wipe sampling will be performed in accordance with EQ's SOP *SP-Othr-3 - Surface Wipes (Revision 3)*. Several wipe samples may be taken in difference areas of targeted equipment (i.e., inside the excavator bucket, outside the excavator bucket, etc.). Each wipe sample will be submitted to the laboratory for PCB analysis.

2.3.4 Upjohn Park Soil Sample Collection

Upjohn Park surface soil samples will be taken to evaluate the potential for PCB contaminated sediment deposited in the Upjohn Park as a result of historical flooding of Portage Creek. Biased sampling locations will be identified through visible observations. These locations will include low lying areas, areas where visible sediment is observed or other areas of possible concern. In areas where vegetation is present the vegetation will be removed and the surface soil will be collected as grab samples of 0-2 inches below ground surface (bgs). Samples will be submitted to the laboratory for PCB analysis. EQ SOP *SP-Soil-4 Surface Soil Sampling* is presented in Appendix 1.

2.3.5 Pre- and Post-Construction Soil Sample Collection

Prior to establishing staging and processing support areas, pre-construction samples will be collected from the support area. Each support area will be divided into 2,500 sf sample areas for PCB analysis and 10,000 sf sample areas for total target compound list (TCL) VOCs, total TCL SVOCs, TCL pesticides, TCL herbicides, and total target analyte list (TAL) metals and PCBs. Each sample area will be sampled by taking a six point composite sample at 0-6 inches bgs in the 2,500 sf grid. A composite sample of four 2500 sf grids will be generated from the residual sample from the six-point composite. This composite sample, representing 10,000 sf will be submitted for the TCL and TAL parameters. ***Figure 10*** presents the proposed sample grids with the grab sample locations within each 2500 sf grid randomly selected. In those grids where total sf is <2,500 sf, a reduced number of sample points will be collected. In areas where the soil will be removed to install collection reservoirs, samples will be collected from the bottom of the targeted excavation. For example the collection reservoir for the dewatering staging pad will be placed 36 inches bgs. Samples will be collected at the bottom of the excavation prior to placement of materials necessary to construct the collection reservoir. Samples will be collected at approximately 0-6 inches in the bottom of excavations. Upon completion of work for each support area, such as the truck tire wash in SA7 post construction sampling will be performed. See ***Figures 11*** and ***12*** for support areas associated with removal activities in SA 6 and SA7. Two composite samples will be taken in SA7, one composite of the truck tire wash area and one composite of the decontamination and staging pad area. One composite sample will be taken from the tire/equipment wash area in SA6. Additional samples will be collected in access road areas. See ***Figure 13*** for support areas associated with removal activities in SA 5-Axtell and SA 5-D. ***Figure 14*** presents support areas for removal area SA 5-C. Support areas for the remaining removal areas will be identified in additional documentation (project plan addenda's) for the project in the subsequent years.

Post construction sampling will be performed in the same manner as pre-construction sampling. Sampling will be accomplished using a soil trier. Individual grab samples will be composited in the field by placing soils into a plastic baggie and mixing. One random location for each 10,000 sf or less area will be identified to collect grab samples for volatiles. Soil collected at this location will be placed directly into a 4 ounce (oz) glass jar with a Teflon lined

lid. All samples will be analyzed for total target compound list (TCL) VOCs, total TCL SVOCs, TCL pesticides, TCL herbicides, total target analyte list (TAL) metals and PCBs. PCBs will be collected for each 2,500 sf area. To ensure work activities have not resulted in contaminating support areas results of the post construction samples will be compared to results of the pre-construction sampling. Procedures for surface soil sampling are presented in EQ SOPs *SP-Soil-4 Surface Soil Sampling*. This SOP is presented in Appendix 1. See the Quality Assurance Project Plan (QAPP) for target compound list and associated methods.

2.3.6 Borrow Source Material Sample Collection

Prior to using any borrow source material for backfill and restoration needs the materials will be sampled and analyzed to screen for potential contaminants. Composite samples of source material such as sand, and soils will be analyzed at a minimum rate of one sample per 5,000 CY at each location or supplier of each type of material. River run rock will be sampled *in situ* at its source location. Composite samples will consist of six subsamples collected from various regions of the borrow source material, to be selected in the field and biased towards any areas of staining, if present. Samples will be analyzed for total TCL VOCs, total TCL SVOCs, total TAL metals and PCBs.

2.3.7 Water Quality Sample Collection

2.3.7.1 Turbidity Measurements

During removal of PCB contaminated soil and sediment water quality monitoring will be performed upstream and downstream of the Removal Area to ensure control measures are effective in preventing the release of contaminated sediment. Water quality monitoring will include real time turbidity monitoring and surface water sampling. During removal each area will be isolated using sheet pile cofferdams. Surface water will be temporarily diverted by using by-pass pumping around the isolated excavation area and discharging downstream of the excavation area. To ensure the effectiveness of the cofferdam system the water quality will be monitored 200 ft upstream of the upstream cofferdam, 200 ft and 300 ft downstream of the discharge point. Turbidity monitoring will not be performed in SA7, as the removal activities are isolated to the flood plain. Real time turbidity will be measured with turbidity stations

consisting of turbidity probes submerged mid depth at each of the specified locations. Data will be collected using data loggers stored in weather proof containers mounted on poles. The weather proof containers will also contain cellular modems to facilitate transfer of data to a work station at the Command Post. The data loggers will be programed to record turbidity measurement on 30 minute intervals. Additional turbidity measurements will be taken with a hand held turbidity meter. Information regarding ALs and frequency of measurements using the hand held meter are presented in Section 2.2.

2.3.7.2 Surface Water Sample Collection

Surface water samples will be collected weekly from the upstream and 300 ft downstream stations. These surface water grab samples will be submitted to the laboratory for PCBs, TSS, and phosphorus. Procedures for surface water sampling are presented in EQ SOPs *SP-Watr-4 Surface Water Sampling*. This SOP is presented in Appendix 1.

2.3.8 Personnel Sample Collection

Personnel sampling will be performed the first two weeks (or possibly during removal of highly concentrated material) of sediment removal and stabilization activities. One worker within the staging area will have his/her breathing zone monitored for PCBs. Sampling and analysis will be performed according to NIOSH Method 5503. Procedures for air monitoring and sampling are presented in EQ SOPs *SP-Air-9 Low Flow Air Sampling*. This SOP is presented in Appendix 1.

2.3.9 Area Sample Collection

Area sampling will be performed throughout the duration of the removal effort. Area sampling will include perimeter sampling at the staging/processing areas during stabilization activities. Samples will be taken for PCBs and total particulates. Sampling and analysis will be performed in accordance with NIOSH Methods 5503 and 0500 respectively. Procedures for air monitoring and sampling are presented in EQ SOPs *SP-Air-9 Low Flow Air Sampling*.

In addition to perimeter sampling periodic monitoring will be performed for total particulates using a DataRam particulate monitor. These measurements will be taken within the stabilization area and removal areas as needed. Procedures for air monitoring are presented in EQ SOPs *SP-Air-8 Particulate Sampling, Real Time*. This SOP is presented in Appendix 1.

2.3.10 Waste Water Sample Collection

Recharge groundwater, decontamination water, and liquids removed from the sediment dewatering process will be treated at an on-site wastewater treatment plant and discharged back to Portage Creek, in accordance with the SRD. Once construction has been completed of the on-site wastewater treatment system and water treatment has been initiated sampling will begin. For the first two weeks of waste water treatment samples will be taken daily of the influent, between carbon units (Mid-GAC) and effluent monitoring points. Samples will be taken at designated sample ports as grab samples. Section 3 presents the sample handling requirements including sample volume and preservation requirements. These samples will be analyzed for PCBs, TSS and phosphorus. If the results from these first two weeks of sampling are satisfactory the sampling frequency will be reduced to once a week for PCBs and TSS, with phosphorus sampled once a month. Mid-GAC results will be reviewed to evaluate potential breakthrough of the carbon. Effluent results will be evaluated to ensure discharge concentrations are consistent with SRD requirements.

2.3.11 Confirmation Sediment Sample Collection

After removal of the PCB contaminated soils and sediments confirmation sampling will be performed prior to restoration. One six-point composite sample will be collected in approximately 2,250 sf grids to a depth of 6". Results will be evaluated against the following performance or cleanup standards. The performance standard for designated stream sediments is $\leq$ 10 mg/kg of PCBs with a performance standard goal of 1 mg/kg. The performance standard for designated PCB contaminated floodplain and bank soils within the Portage Creek Area is 10 mg/kg with a performance standard goal of 5 mg/kg.

Node samples will be collected for the USEPA statistical analysis of project quality objectives. Six discrete samples will be collected from eight of the sample grids during confirmation sampling. The six sample locations will coincide with the locations used for the six point composite sampling.

3 SAMPLING QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

This section discusses the quality assurance/quality control (QA/QC) procedures to be used during implementation of the TCRA. These procedures will be implemented in conjunction with the QA/QC procedures contained the in the Portage Creek Removal QAPP.

3.1 QA/QC Samples

To assess the sampling and analysis process QC samples will be submitted for chemical analysis. Field duplicate samples will be split from pre-removal sediment grab samples by field personnel and submittal for laboratory analysis. The samples shall be submitted to Test America Laboratories facility in Dayton, Ohio (TAL-Dayton) along with the field samples, representing a rate of one field duplicate sample per 10 field samples collected.

For post removal confirmation sampling, FD will be collected during field composite sampling and submitted to TAL-Dayton for analysis. Approximately eight confirmation sample grids will be selected for node sampling. In these grids six discrete sediment samples will be taken as well as the one composite sediment sample. USEPA will perform statistical analysis to evaluate project objectives.

During Pre- and Post-Construction sampling FD will be randomly taken. FD will be submitted to the laboratory at a rate of 1/10 project samples.

When sampling surface waters for PCBs, TSS and phosphorus FD will be taken at a rate of 1/10 project samples. Periodic checks of the submerged turbidity meters will be performed by taking concurrent measurements with the hand held turbidity meter.

FD of the waste water treatment plan effluent will be taken throughout the duration of the project. FD will be taken at a rate of 1/10 project samples.

Blank wipe samples will be analyzed by the laboratory to ensure the absence of matrix interference from the media used to collect wipe samples. Since wipe samples kits will be provided by the laboratory, no additional field collection will be necessary.

Table 4 presents the QA/QC samples to be taken and submitted for analysis. In addition, a sediment sample will be submitted at a rate of 1 sample per every 20 samples submitted for

chemical analysis for use by the analytical laboratory as matrix spike (MS) and matrix spike duplicate (MSD) pairs.

TABLE 4. QA/QC SAMPLES

Sampling Task	No. Field Samples	No. Field Duplicate[3]	Field Blanks	MS/MSD
Targeted Grid Sampling	110-113	1/10 field samples	0	As needed by method
Waste Characterization	TBD	0	0	As needed by method
Extent of Contamination – Upjohn Park	TBD	1/10 field samples	0	As needed by method
Pre- & Post-Construction	TBD	1/10 field samples	1/10 field samples	As needed by method
Source Material	TBD	0	0	As needed by method
Water Quality Monitoring (SW Sampling)	TBD	1/10 field samples	0	As needed by method
Water Quality Monitoring (turbidity)	TBD	TBD	N/A	N/A
Personnel Workers	TBD	0	2 per sampling event	0
Area Monitoring	TBD	0		0
Waste Water Treatment	TBD	1/10 field samples	0	As needed by method
Confirmation Sediment Sampling	72	8	0	4

Notes:
1. TBD – to be determined, number of field samples can be dependent on duration of removal, water treatment, etc.
2. N/A – not applicable.
3. Frequency of field duplicates will be determined based on total number of samples taken for the project, versus number of samples taken for each sampling event.

3.2 Sampling Handling

3.2.1 Sample Designation System

A concise and easily understandable sample designation system is an important part of the sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy re-sampling of certain locations to evaluate temporal changes. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events/conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected. Sample nomenclature will follow the guidelines presented in ***Table 5***.

TABLE 5. SAMPLE NOMENCLATURE

Sampling Task	Sample ID	Matrix ID	Example	Explanation
Targeted Grid Sampling	PRSD-Removal Area-Grid ID-Core number (depth interval)	SD	PRSD-SA5-A6-1 (0-12")	*Pre-removal sediment sampling from Removal Area 5A, grid A6, core number one at 0-12"*
Waste Characterization	WCSD-Removal Area-A or B	SD	WCSD-SA5A-A	*Waste characterization composite sample taken from Removal Area 5A, TSCA sediment*
Wipe Sampling	Wipe-Equipment Identification-Removal Area	WP	Wipe-Excavator Inside Bucket-SA6	*Wipe sample taken from the inside of the bucket of the excavator after removal activities in Area 6.*
Pre- & Post-Construction	PREC(or PSTC)-Support Area name-Removal Area sample number	SO	PSTC-Staging Pad-SA7-1	*Post-Construction Sample #1 taken from Staging Pad at Removal Area 7*
Upjohn Park Surface Soils	UJP-SS- Date-Sample number	SO	UJS-SS-093111-10	*10th Surface Soil Sample taken at Upjohn Park on 9/31/11*
Source Material	BS-Vendor-Material-Date-sample number	SO	BS-Joe's Fill-sand-100511-1	*First sample taken of Borrow Source sample of sand material taken from vendor 'Joe's Fill' on 10/5/11*
Water Quality Monitoring	Area-Location (US or DS200 or DS300)-SW-Date	SW	SA3A-DS300-SW-101511	*Surface water sample taken on 10/15/11at turbidity monitoring station located 300 ft downstream of Removal Area SA3A*
Personnel Workers	Task-Date	AR	Excavator-101011	*Personnel sample taken of worker on excavator on 10/10/11*
Area Monitoring	PRA(or SA)-Removal Area-Date-#	AR	PSA-SA7-092911-1	*First perimeter air sample taken in the support area for Removal Area 7 on 9/29/11*
Waste Water Treatment	WWINF(or MID, EFF)-Date	WW	WWINF-093011	*Wastewater sample taken at influent on 9/30/11*
Confirmation Sediment Sampling	CSD-Removal Area-Grid ID	SD	CSD-SA5-A7	*Confirmation sediment sample taken from Removal Area 5, Grid A7*
Node Sediment Sampling	NSD-Removal Area-Grid ID-#	SD	NSD-SA6-13-1	*Node confirmation sediment sample taken from Removal Area 6, Grid 13, sample number 1*

Notes:

1. ID – identification, SD – sediment, WC – waste characterization, SO – soil/solid, SW – surface water, AR – air, WW – waste water, BS – borrow source
2. PREC – pre-construction, PSTC – post-construction, UP – 200 ft upstream of removal area, DS200 – 200 ft downstream of removal area, DS300 – 300 ft downstream of removal area
3. INF – influent, MID – between GAC, EFF – effluent
4. All dates are recorded as MMDDYY.

3.2.2 Sample Containers and Preservation

Sample container preservation, packaging, shipping, and storage will be conducted in accordance with EQ SOP *SP-Othr-1 – Sample Packaging, Shipment, and Storage* (Appendix 1).

Table 6 presents the required containers for each matrix and the parameter group. Additionally, the proper preservative and associated holding time for each parameter are included in the table.

A separate sealed container of water not intended for chemical analysis will be included in every cooler submitted to the analytical laboratory to be used as a temperature blank. Upon receipt at the laboratory, the temperature of the water in the temperature blank will be measured to verify that the sample has been properly chilled. For the samples requiring temperature preservation, if the sample is received at a temperature above 6°C, the EQ chemist will be contacted immediately to make necessary changes in shipping and packaging, and to determine if analysis will be conducted.

3.2.3 Sample Packaging and Shipping Requirements

As noted above sample packaging, shipping and storage will be conducted in accordance with EQ SOP SP-Othr-1. All samples will be transported and/or shipped under EQ's standard chain of custody procedures, custody seals will be utilized for every cooler of samples except when EQ personnel drop off samples. For the Portage Creek Removal effort samples will either be picked up by TestAmerica's Michigan service center in Brighton, MI a third party courier, transported to Dayton by EQ personnel or shipped via Federal Express. ALS in Holland, MI will provide support for any rush analysis, such as confirmation sediment samples. Test America and ALS will store samples for a period of 30 days beyond the issue of the final analytical laboratory report.

3.3 Documentation

EQ will maintain field records sufficient to recreate all sampling and measurement activities. The following information will be recorded in indelible ink for all field activities: 1) location, 2) date and time, 3) identity of person(s) performing the activity, 4) visitors, and 5) weather conditions. For field measurements, the following additional information will be recorded: 1) sample type and sampling method, 2) identity of each sample and depth(s), where

TABLE 6. SAMPLE PARAMETERS, METHODS, CONTAINERS, AND PRESERVATION

Parameter	Matrix	Analytical Method	Container	Preservative	Holding Time
Targeted Grid Sediment Sampling					
PCBs	sediment	SW8082	4 oz, Gl	4°	14 days for extraction, 40 days for analysis
Waste Characterization Sampling					
TCLP VOCs	sediment	SW1311/8260	4-oz Gl WM	4°C	14 days for TCLP extraction, 14 days for analysis
TCLP SVOCs	sediment	SW1311/8270	8-oz Gl WM[5]	4°C	14 days for TCLP extraction, 7 days for preparative extraction, 40 days for analysis
TCLP Pesticides	sediment	SW1311/8081	8-oz Gl WM[5]	4°C	
TCLP Herbicides	sediment	SW1311/8151	8-oz Gl WM[5]	4°C	
TCLP 8 RCRA Metals	sediment	SW1311/6010, 7470	8-oz Gl WM[5]	4°C	28 days for Hg, 6 months for all other metals for TCLP extraction, 28 days for Hg, 6 months for all other metals for analysis
PCBs	sediment	SW8082	4 oz, Gl[5]	4°	14 days for analysis
Total Cyanide	sediment	SW9012	4 oz, Gl[5]	4°	14 days for analysis
Total Sulfide	sediment	SW9034	4 oz, Gl[5]	4°	7 days for analysis
Flashpoint	sediment	1010/1020	4 oz, Gl[5]	4°	None
pH	sediment	9045	4 oz, Gl[5]	4°	Immediately
Wipe Sampling					
PCBs	wipe	SW8082	4 oz, Gl	4°	14 days for extraction, 40 days for analysis
Upjohn Park Surface Soil Sampling					
PCBs	soil	SW8082	4 oz, Gl	4°	14 days for extraction, 40 days for analysis
Support Area: Pre-Construction & Post-Construction Surface Soil Sampling					
TCL VOCs	soil	SW8260	4-oz Gl WM	4°C	14 days for analysis
TCL SVOCs	soil	SW8270	8-oz Gl WM[7]	4°C	14 days for extraction, 40 days for analysis
TCL Pesticides	soil	SW8081	8-oz Gl WM[7]	4°C	
TCL Herbicides	soil	SW8151	8-oz Gl WM[7]	4°C	
TAL Metals	soil	SW6010 or 6020 & 7471	8-oz Gl WM[7]	4°C	28 days for Hg and 6 months for all other metals
PCBs	soil	SW8082	4-oz Gl WM[7]	4°C	14 days for analysis
Borrow Source Material Sampling					
TCL VOCs	solid	SW8260	4-oz Gl WM	4°C	14 days for analysis
TCL SVOCs	solid	SW8270	8-oz Gl WM[8]	4°C	14 days for extraction, 40 days for analysis
TCL Pesticides	solid	SW8081	8-oz Gl WM[7]	4°C	
TCL Herbicides	solid	SW8151	8-oz Gl WM[7]	4°C	

Table 6 - continued

Parameter	Matrix	Analytical Method	Container	Preservative	Holding Time
TAL Metals	solid	SW6010 or 6020 & 7471	8-oz Gl WM[8]	4°C	28 days for Hg and 6 months for all other metals
PCBs	solid	SW8082	4-oz Gl WM[8]	4°C	14 days for analysis
Water Quality Monitoring					
PCBs	SW	E608	1 L Gl Amber	4°C	7 days for extraction, 40 days for analysis
TSS	SW	SM2540D	500 ml, Pl	4°C	7 days for analysis
Phosphorus	SW	SM4500P	250 ml, Pl	H_2SO_4, 4°C	28 days for analysis
Personnel Workers					
PCBs	air	NIOSH 5503	filter, sorbent tube[9]	4°C	2 months
Area Monitoring					
PCBs	air	NIOSH 5503	filter, sorbet tube[9]	4°C	2 months
Total Particulates	air	NIOSH 0500	PVC[10]	None	None
Waste water Treatment Sampling					
PCBs	WW	E608	1 L Gl Amber	4°C	7 days for extraction, 40 days for analysis
TSS	WW	SM2540D	500 ml, Pl	4°C	7 days for analysis
Phosphorus	WW	SM4500P	250 ml, Pl	H_2SO_4, 4°C	28 days for analysis
Confirmation Sediment Sampling					
PCBs	sediment	SW8082	4 oz, Gl	4°	14 days for extraction, 40 days for analysis

Notes:

1. VOCs – volatiles, SVOCs – semivolatiles, Hg - mercury
2. TCLP – toxicity characteristic leaching procedure, RCRA – Resource Conservation and Recovery Act, RCRA 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)
3. SW – SW846 EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
4. SM – Standard Methods for Analysis of Water and Wastewater
5. E – USEPA Clean Water Act Methods
6. oz – ounce, ml – milliliter, L – liter, Gl – glass, Pl – plastic, °C – degrees Celsius, WM – widemouth, SW – surface water, WW – waste water, PVC – poly vinyl chloride, H2SO4 – sulfuric acid
7. One 16 oz jar may be submitted for TCLP (SVOCs, Metals), PCBs, flashpoint and pH
8. One 8 oz jar may be submitted for SVOCs, Metals, and PCBs
9. Glass fiber filter + solid sorbent (13-mm glass fiber + florisil, 100 mg/50 mg)
10. 37-mm, 5-µm PVC filter

applicable, from which it was collected, 3) sample volume, 4) sample description (e.g., color, odor, clarity, etc.), and 5) identification of the sampling device.

Records will be kept in the form of logs and standardized forms. These records may be in either hard or electronic versions. The standardized forms to be used are presented in Appendix 2.

3.4 Materials, Supplies, and Equipment

The equipment to be furnished by EQ or its subcontractors for collection of soil samples will be appropriate for taking samples from the materials expected to be found at the site. ***Table 7*** lists the materials, supplies, and equipment (including health and safety supplies) that will be used.

TABLE 7. MATERIALS, SUPPLIES, AND EQUIPMENT FOR SAMPLING

Sample containers	Lab coolers
Lab sample labels	Lab shipping stickers
COC Forms & Seals	Sharpie pens/Rite As Rain
Garbage bags	Tape – Duct, strapping and clear packing
Gloves - Disposable Nitrile	Safety Gear/PPE
Multi-Stage Sediment Sampler	Coring Device/Lexan Sleeve
Turbidity Probe/Station	Trier/Auger Coring Device
Sampling Scoops	Air Filters
DataRam	Personal Sampling Pump
Stainless Steel Bowls	Aluminum Trays
Spud Bar	Shovel
Personnel Waders	Drum
GPS Unit	Tape Measure, pin flags
Saw	5 Gallon Buckets
Handheld Sledge	Plastic Sheeting
Gallon Baggies	Log Book

4 DECONTAMINATION PROCEDURES

All non-reusable sampling equipment and supplies will be placed in a plastic bag after use and disposed of properly. For sampling equipment to be re-used, decontamination will be necessary to ensure that chemical analysis results are reflective of the actual concentrations present at the sample location. Disposable sampling equipment shall not be used to collect more than one sample. Proper decontamination minimizes the potential for cross contamination of samples and sampling sites and the transfer of contamination off site. All non-disposable sampling equipment used for collecting samples for chemical analysis will be decontaminated both prior to initiation of daily field sampling and between sample locations. To the extent possible, dedicated sampling equipment will be used at each sample location. All sampling equipment intended for use with this project will be disposable. The following in-field decontamination procedure will be used for non-dedicated sampling equipment:

- Liqui-Nox (or a non-phosphate equivalent) detergent/tap water wash
- Tap water rinse
- De-ionized water rinse
- Pesticide-grade isopropanol or methanol rinse (organics)
- Pesticide-grade hexane rinse (only if oily residue exists)
- Air-dry.

This process will be accomplished using 5-gallon buckets within the area of investigation. In lieu of air drying, a final de-ionized water rinse may be included (following the pesticide-grade isopropanol or methanol rinse) to avoid the possibility of trace organics adhering to the sampling equipment. If the equipment is not to be used soon, it must be wrapped in aluminum foil or placed in a plastic bag.

All IDW will be properly containerized, sampled, and characterized for disposal, as necessary. IDW waste water will include wash water collected from the washing and rinsing of vehicles, decontamination of sampling equipment, and water collected from isolation dewatering will be transferred and treated by the onsite waste water treatment plant. IDW consisting of

personal protective equipment (PPE) and any other solid waste will be properly containerized for subsequent disposal.

FIGURES

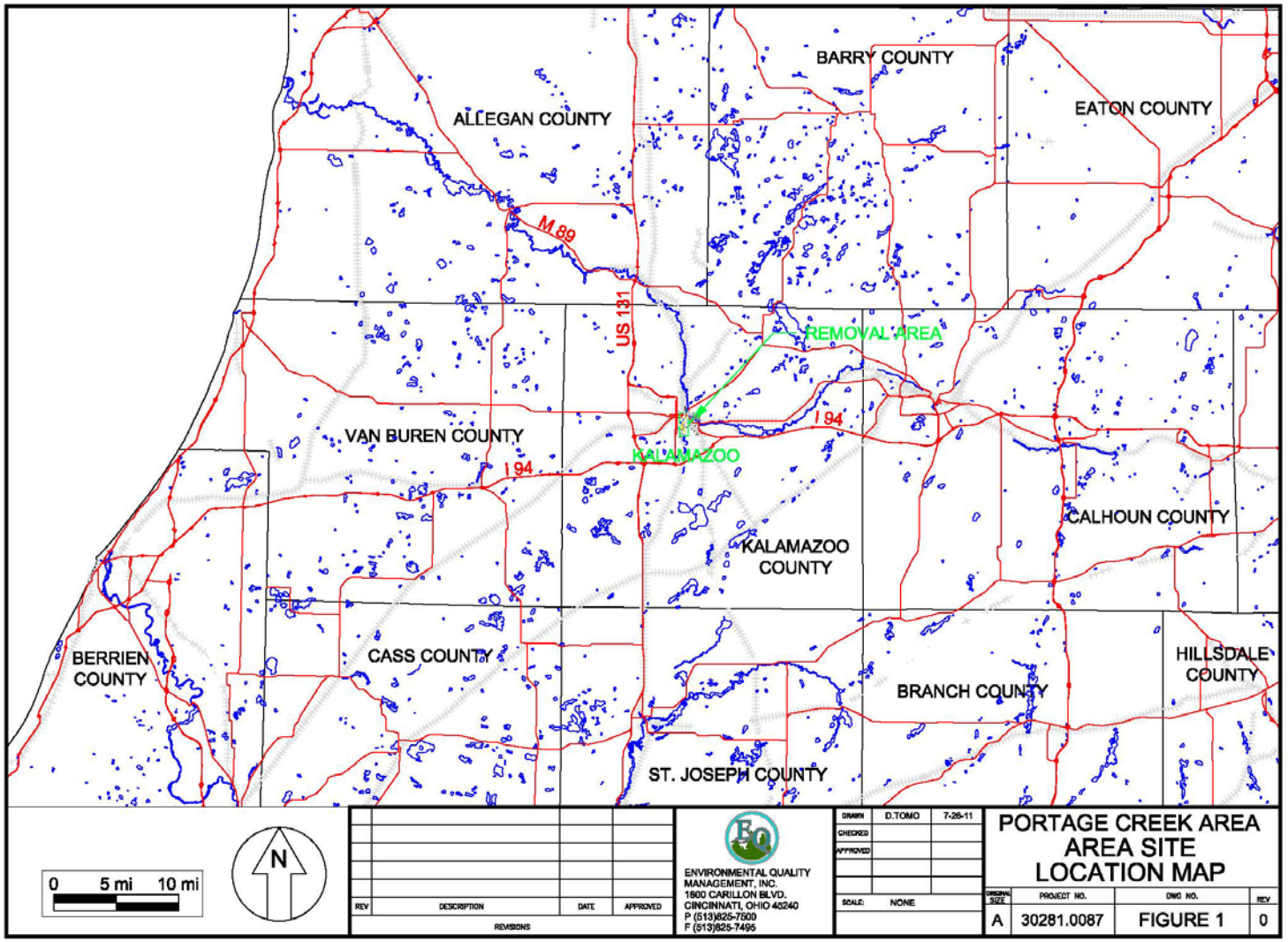

Figure 1. Site Location

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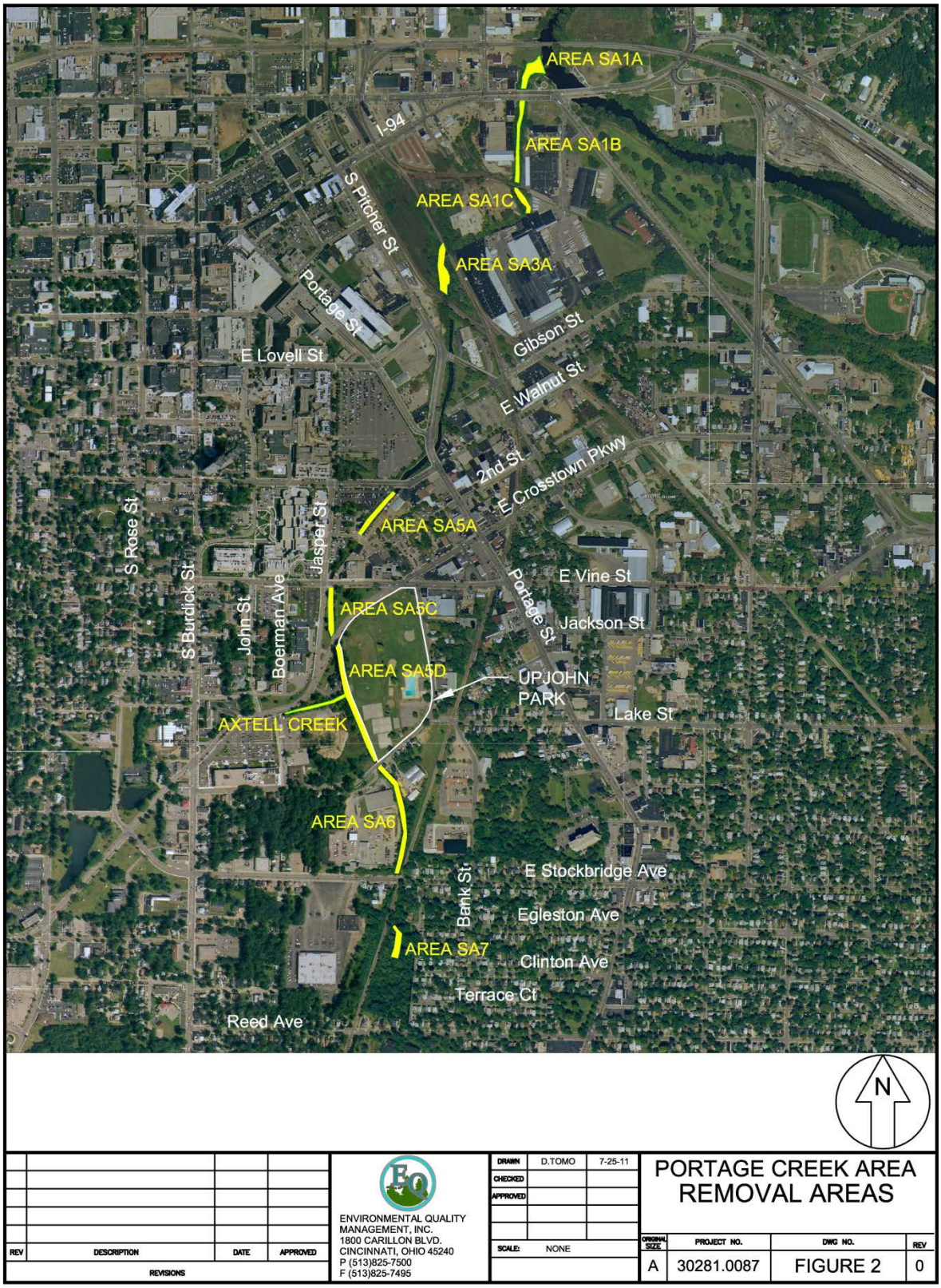

Figure 2. Removal Areas

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Figure 3. Removal Area SA7

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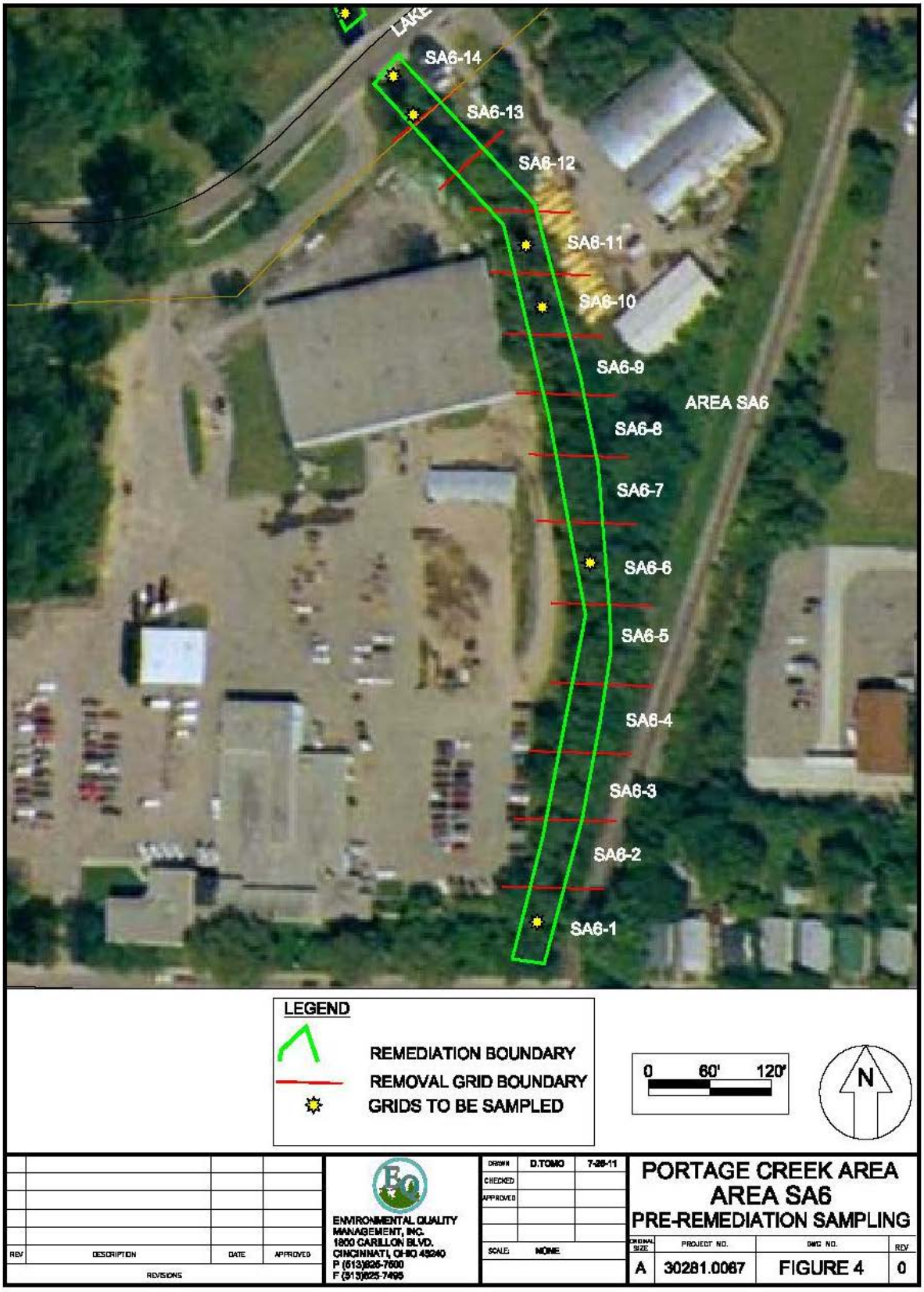

Figure 4. Removal Area SA6

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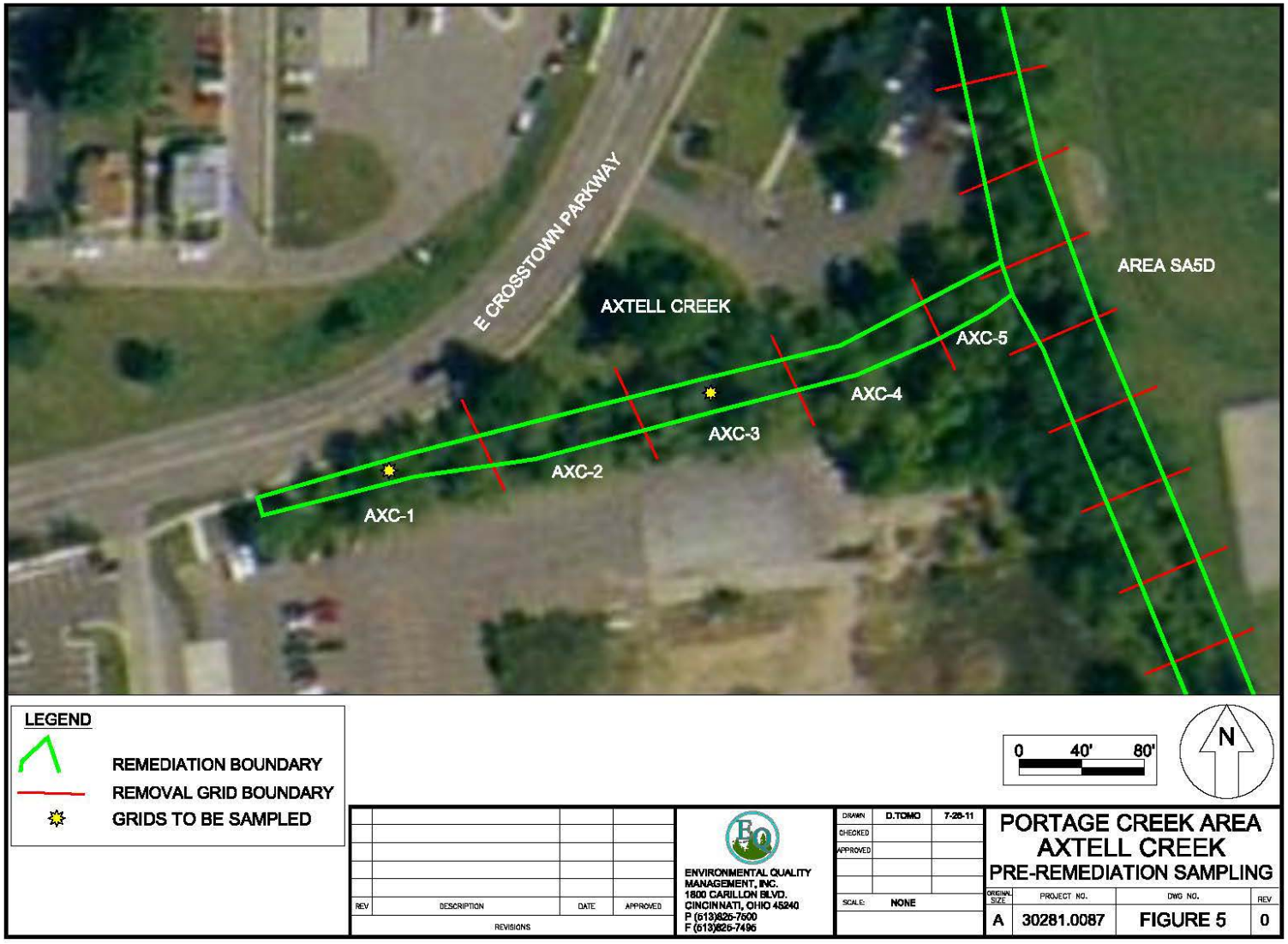

Figure 5. Removal Area Axtell Creek

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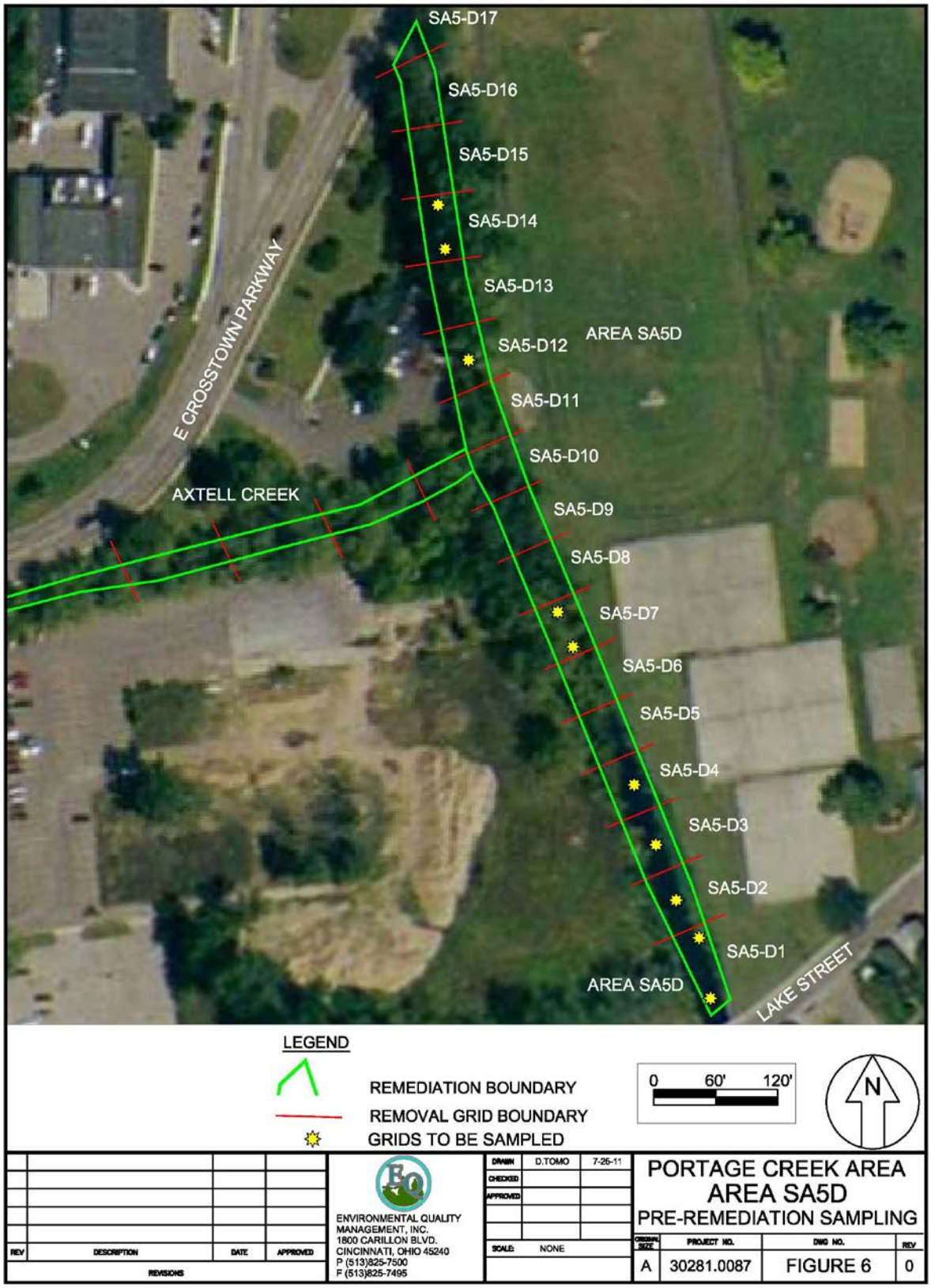

Figure 6. Removal Area SA5D

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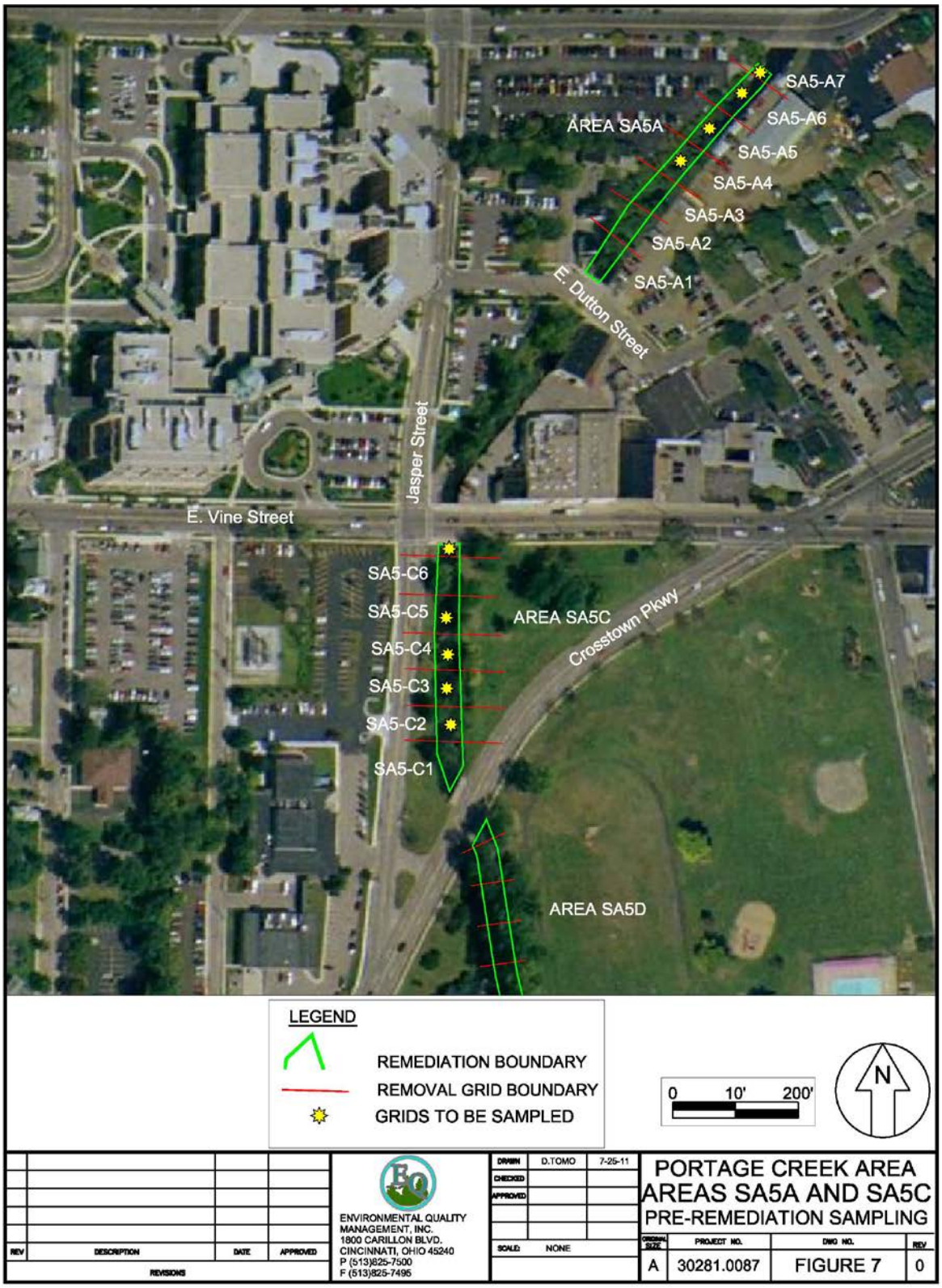

Figure 7. Removal Areas SA5A and SA5C

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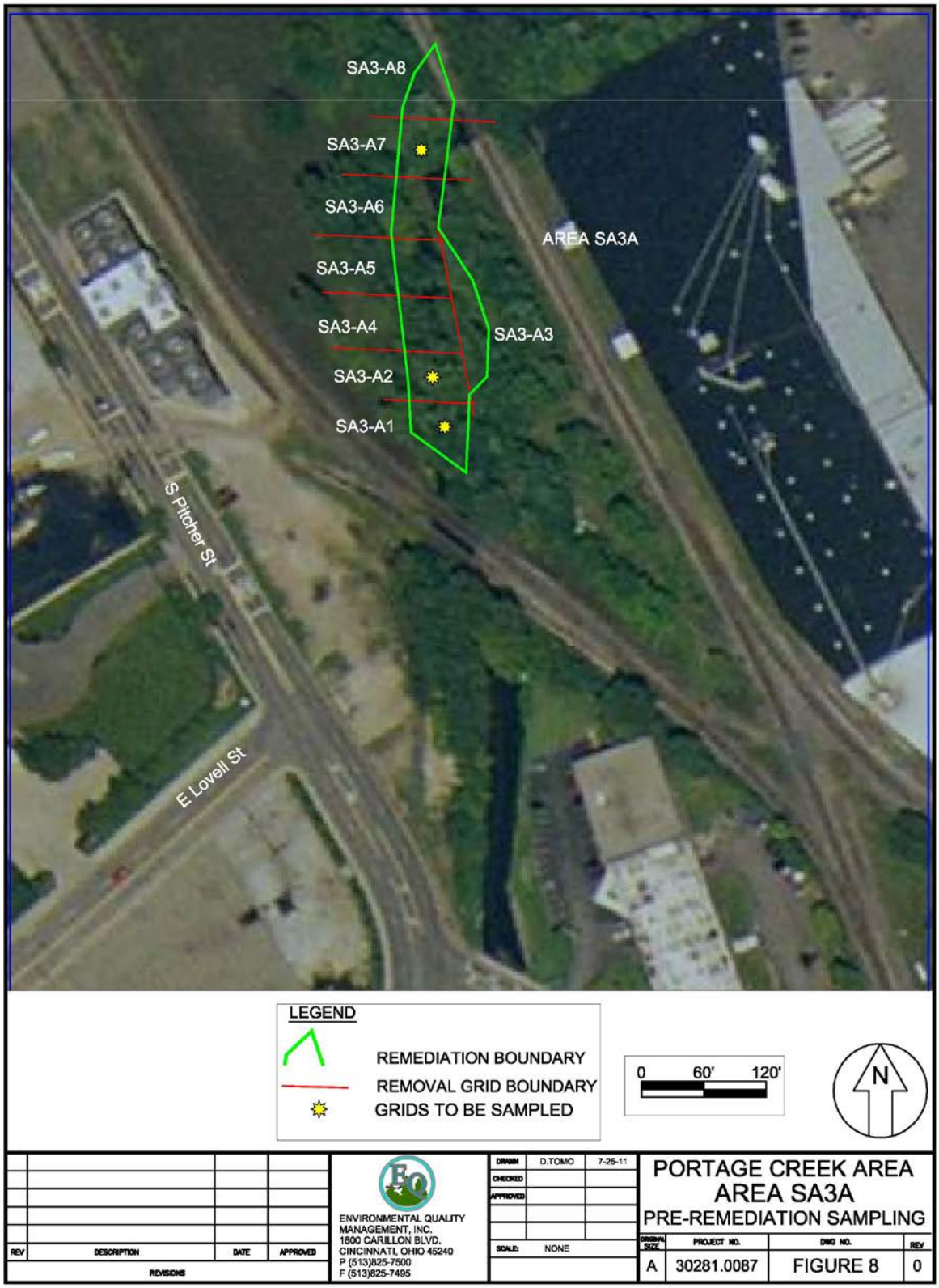

Figure 8. Removal Area SA3

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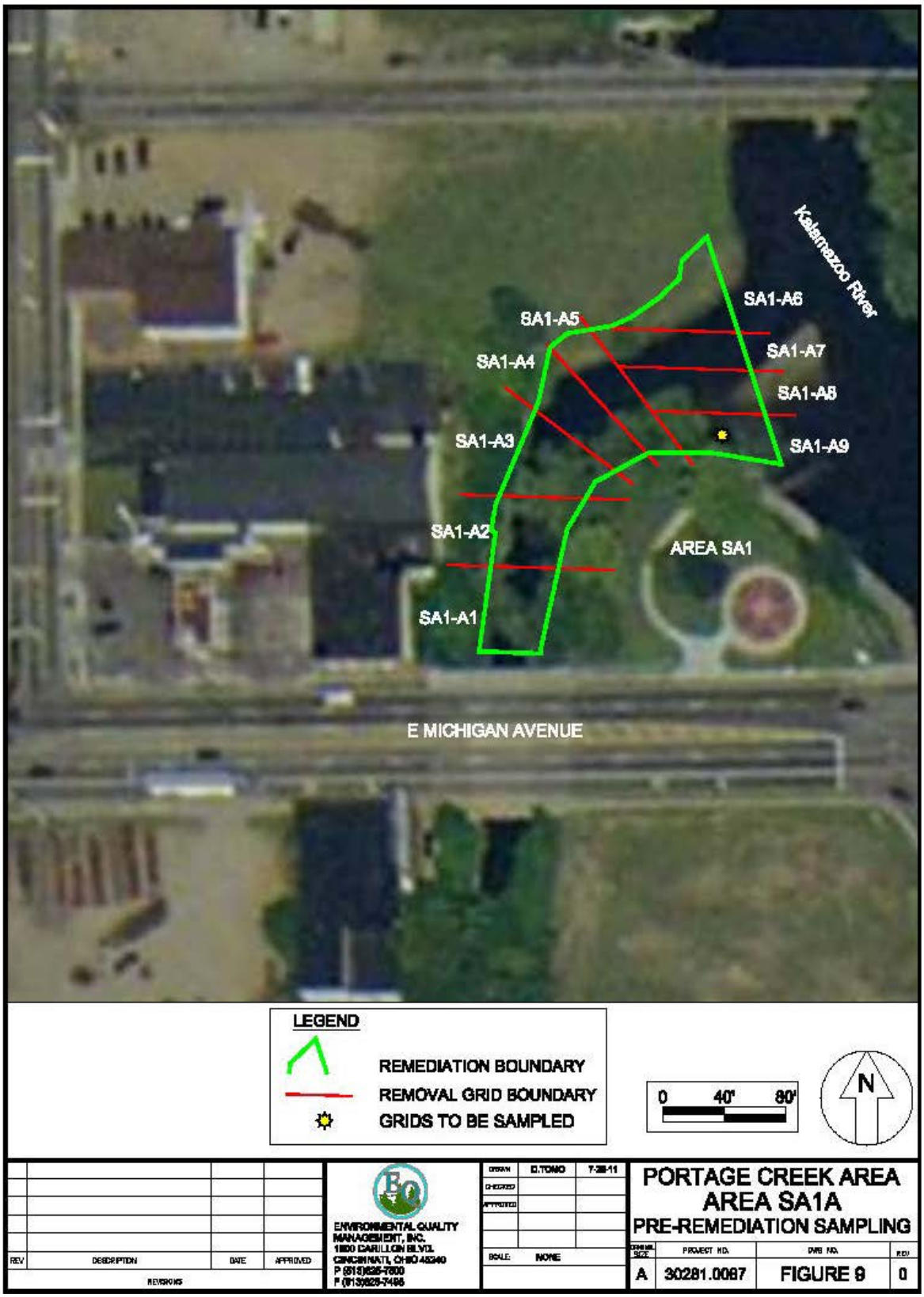

Figure 9. Removal Area SA1

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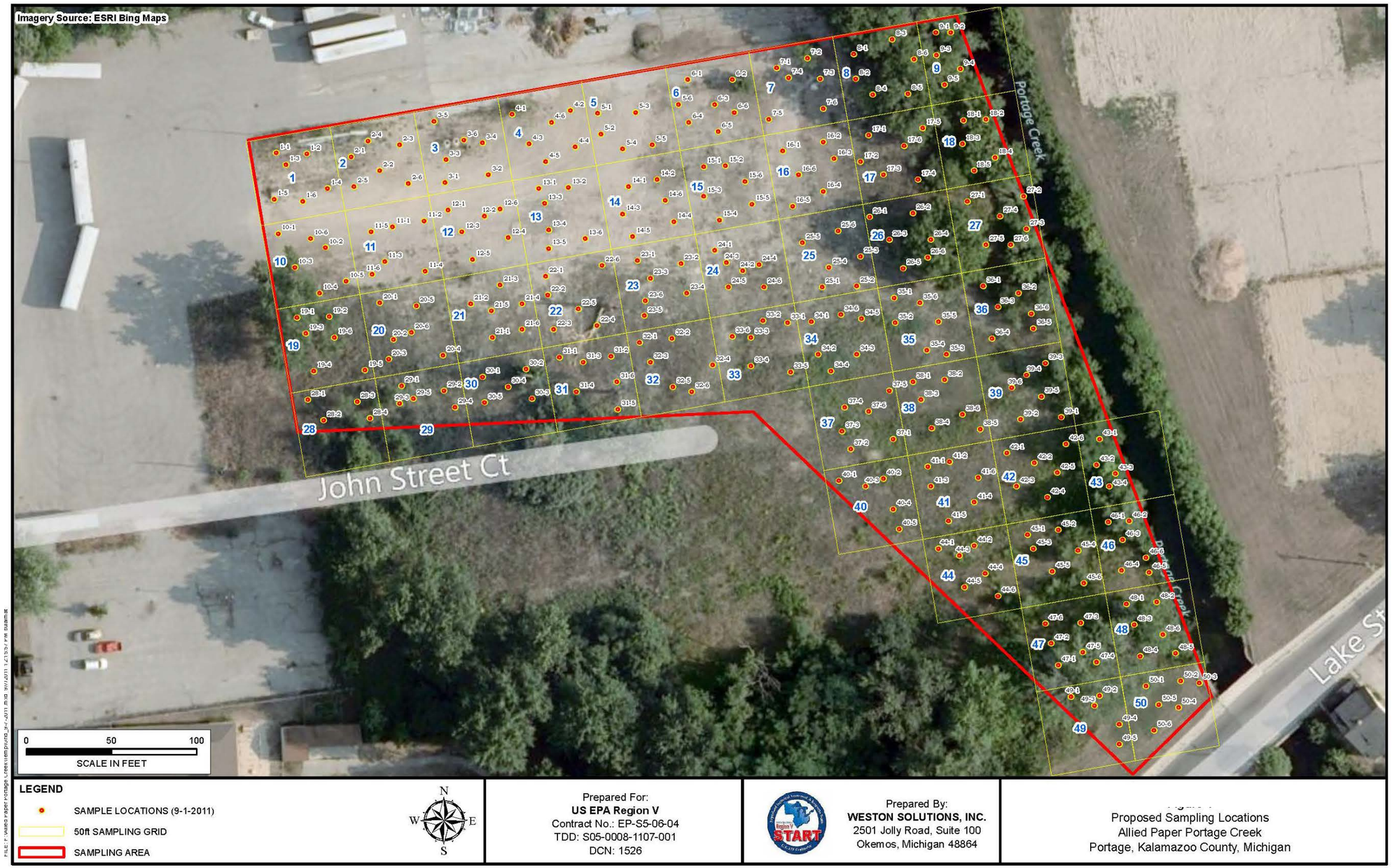

Figure 10. Sampling Locations at the Main Support Area

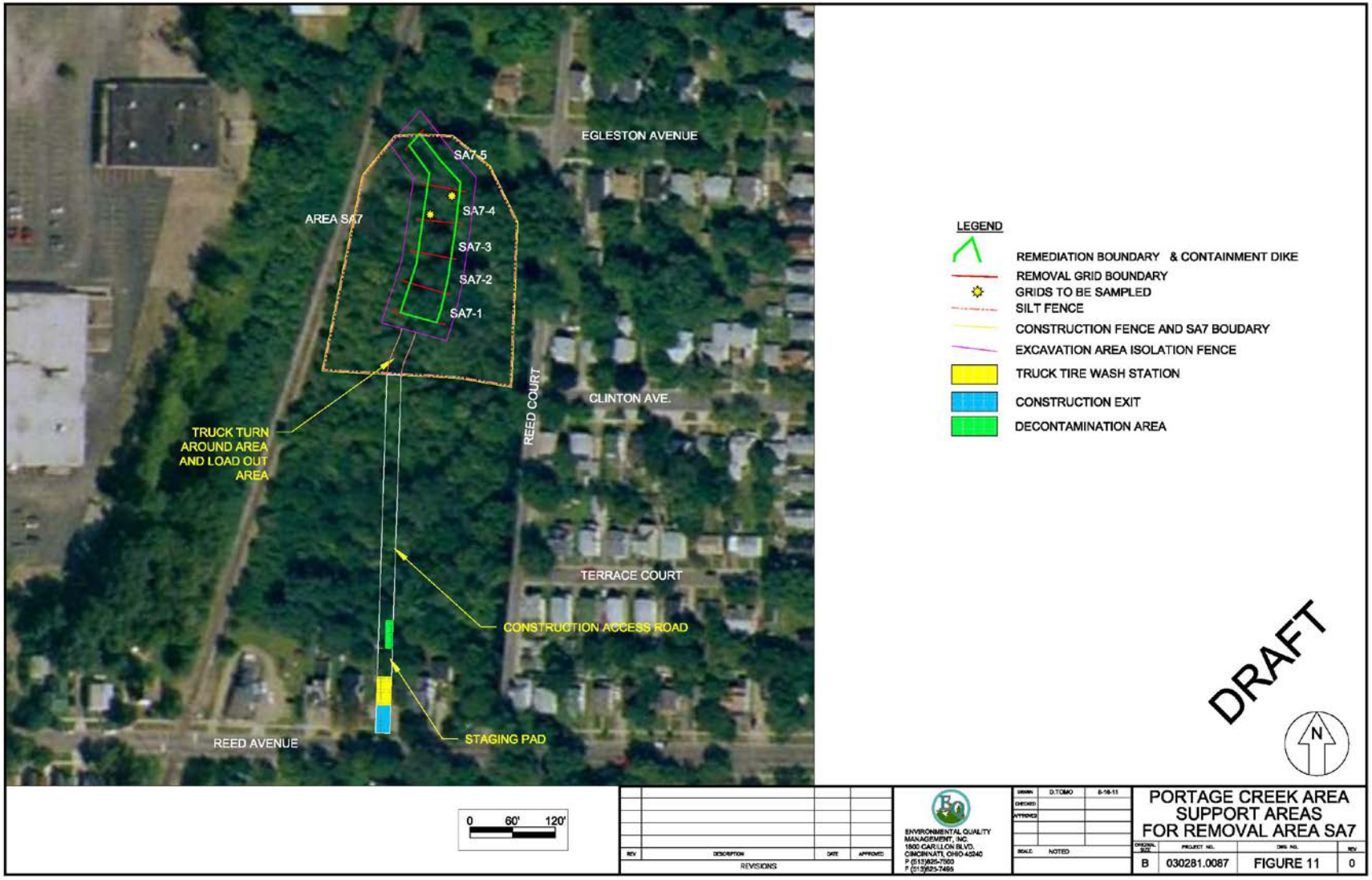

Figure 11. Support Areas for Removal Area SA7

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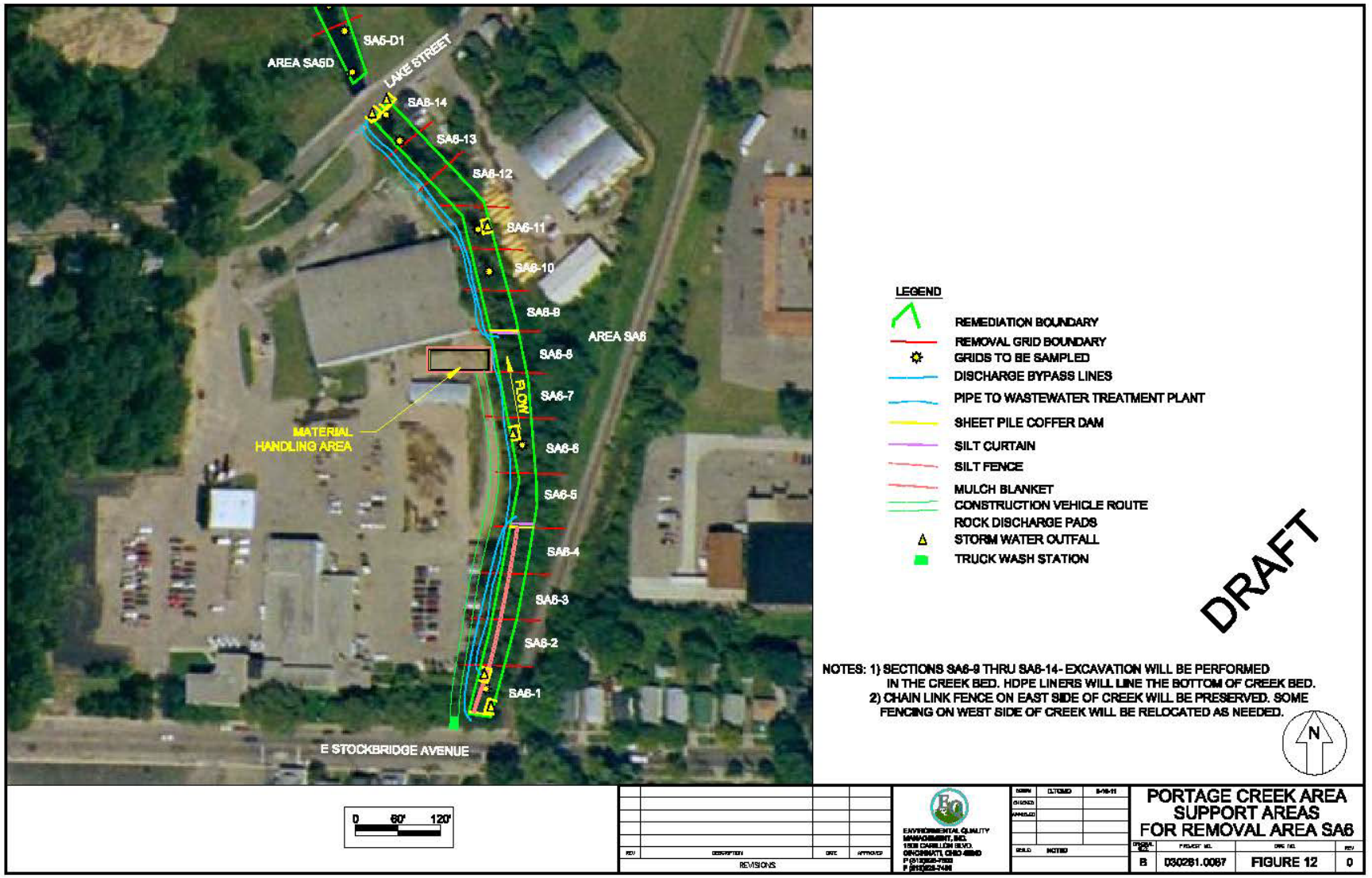

Figure 12. Support Areas for Removal Area SA6

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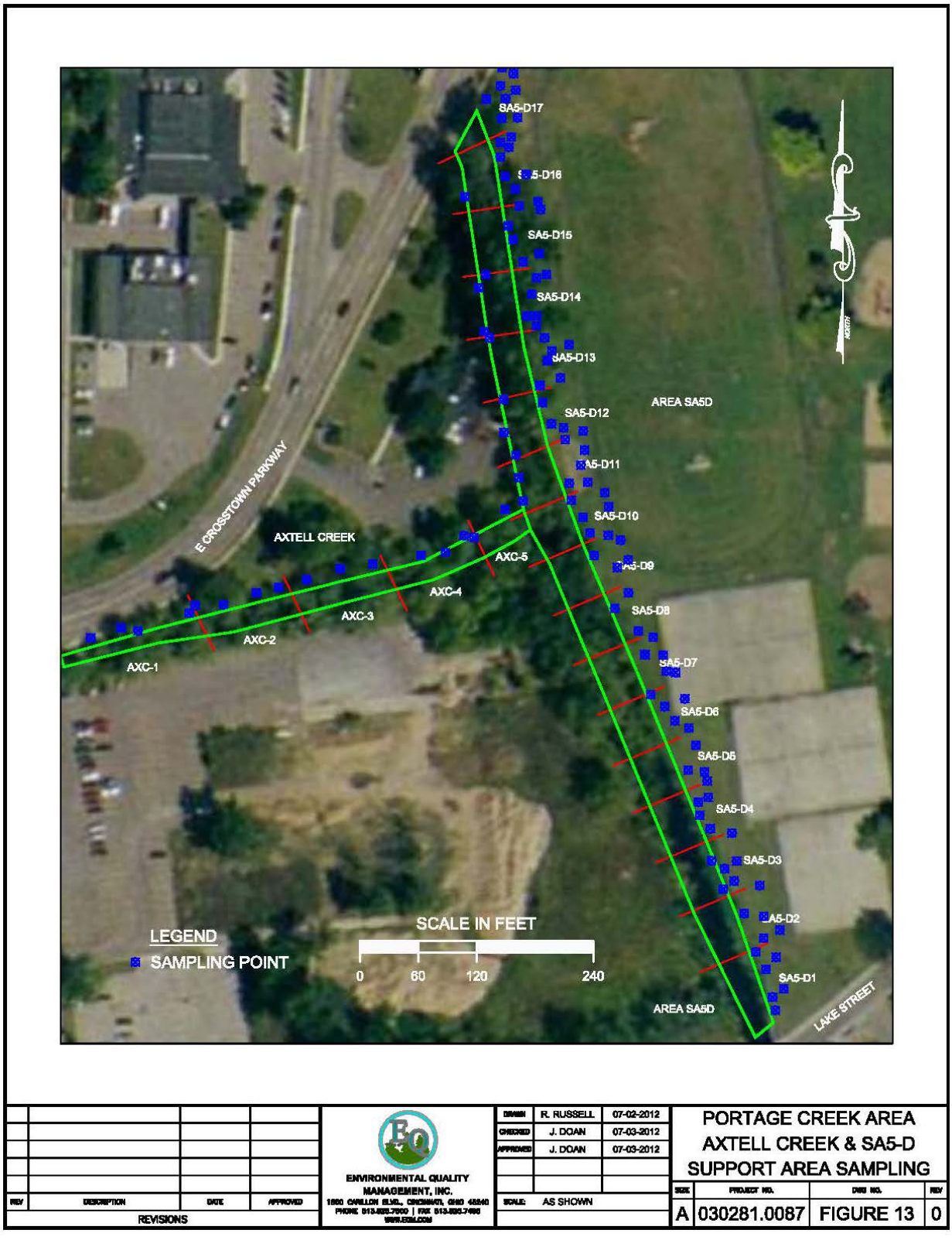

Figure 13. Support Areas for Removal Areas Axtell Creek and SA5-D

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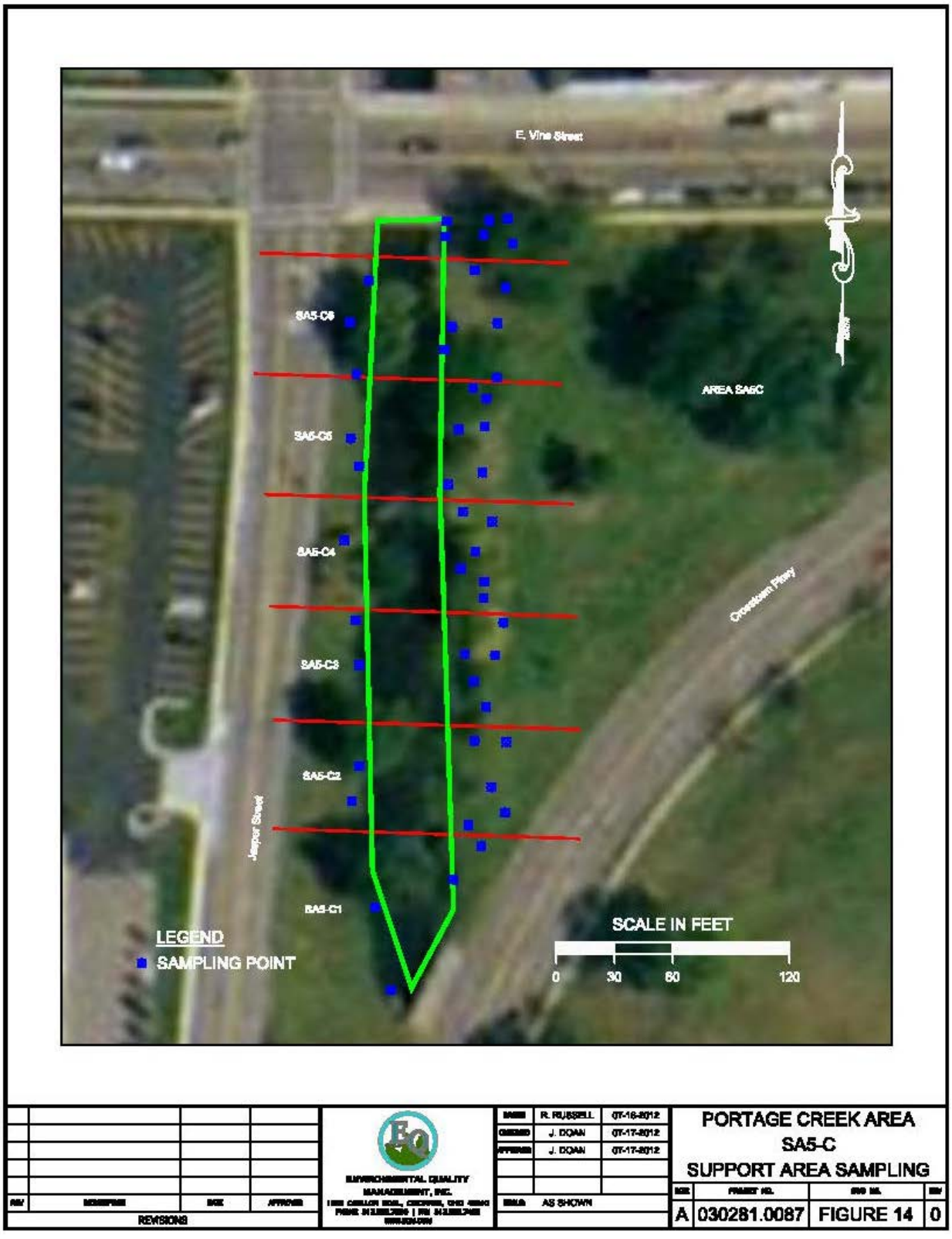

Figure 14. Support Areas for Removal Area SA5-C

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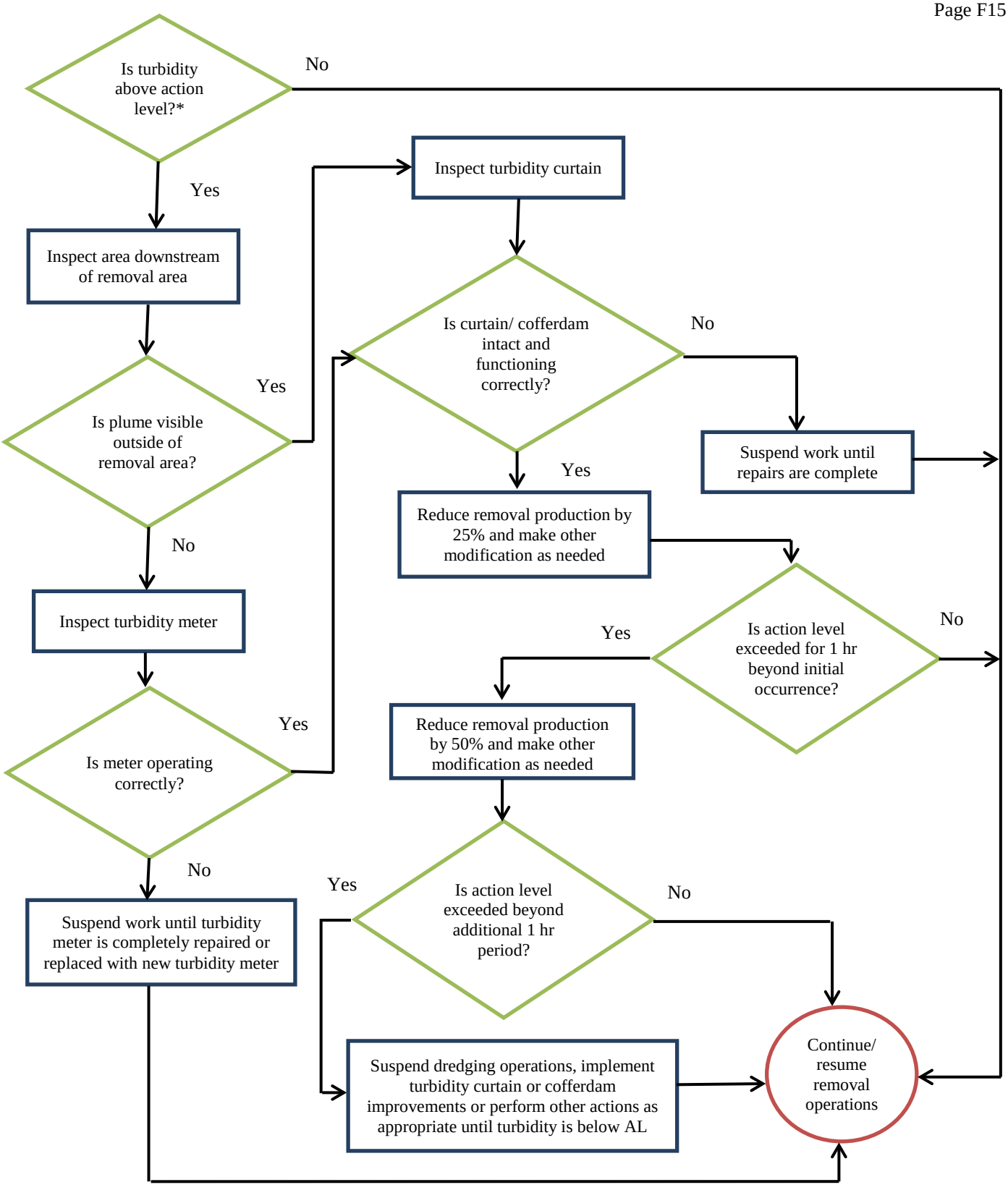

Figure 15. Mitigation Measures Flow Chart for Turbidity Monitoring

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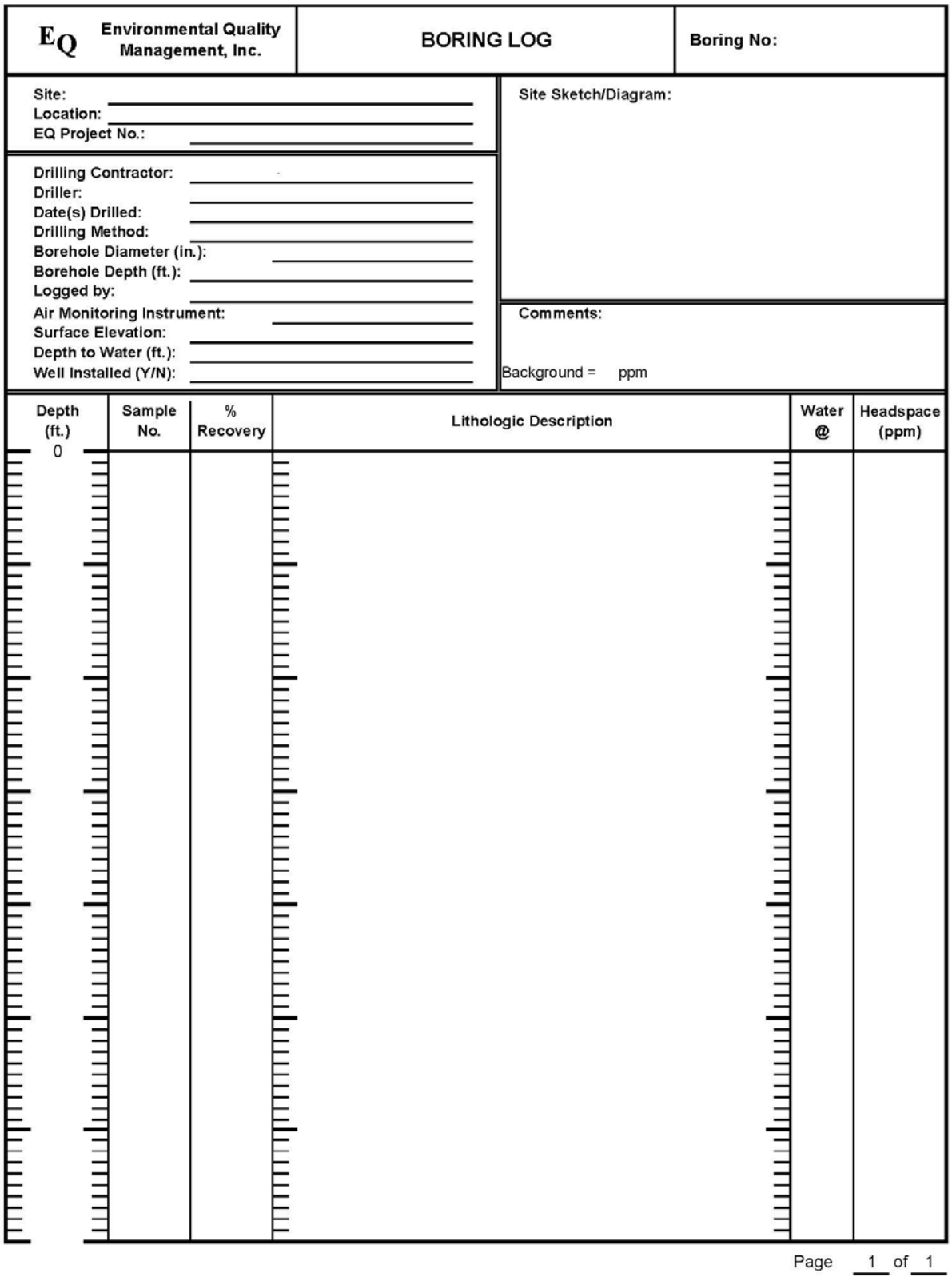

Figure 16. Boring Log

APPENDIX 1

EQ STANDARD OPERATING PROCEDURES

SP-Othr-1: Sample Packaging, Shipment, and Storage
SP-Air-8: Particulate Sampling, Real Time
SP-Air-9: Low-Volume Air Sampling
SP-Soil-1: Sediment Sampling and Handling
SP-Soil-4: Surface Soil Sampling
SP-Watr-7: Surface Water Sampling

APPENDIX 2

STANDARD FORMS AND LOGS

Sampling Equipment Calibration Log
Air Sampling Data Sheet
Air Sampling Record
Real Time Monitoring Log
Sample Label and Custody Seal
EQ Chain of Custody